

The Milbank Memorial Fund
QUARTERLY

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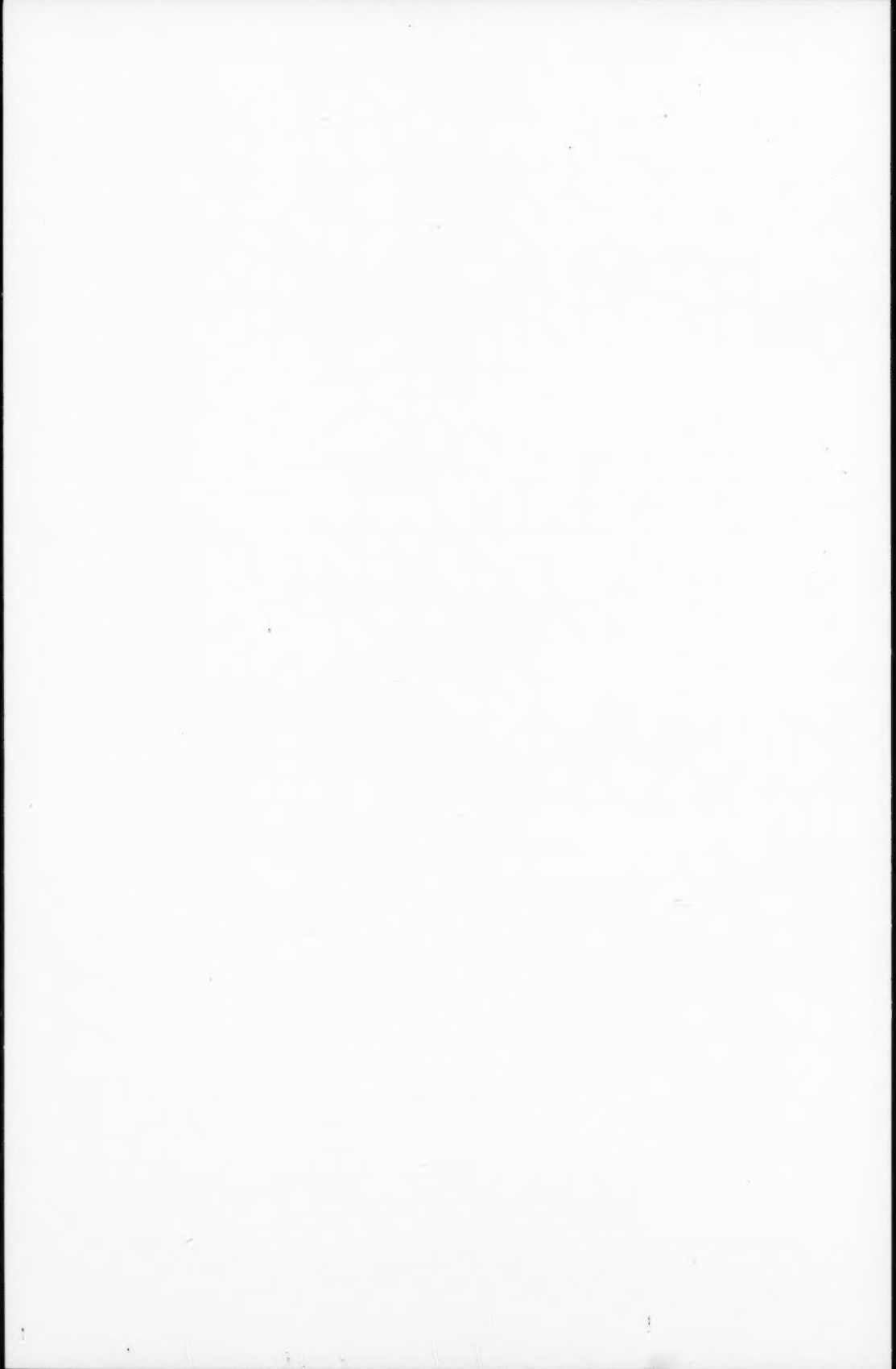
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IN THIS ISSUE

THE second paper in a series, "On The Association Between Health And Social Problems in the Population" is presented in the following pages. It is authored by Antonio Ciocco, Paul M. Densen, and Donovan J. Thompson of the Graduate School of Public Health, University of Pittsburgh and considers "The Influence of Medical Care Problems." This study, based on a sample of families in the Arsenal Health District of the City of Pittsburgh, is designed to examine the problem of association between the health status of families and their social welfare problems serviced by community agencies. This second report analyzes the contacts of the families with social agencies as the result of need for medical care and as the result of other problems.

• • •

The long-term effects of untreated syphilis in Negro males have been investigated by the United States Public Health Service by the method of continuous follow-up of cases over a period of twenty years. This longitudinal, prospective study has afforded unusual data on the natural history of syphilis and on survival of chronic cases. The lethal effect of syphilis is evaluated in the article by J. K. Shafer, Lida J. Usilton, and Geraldine A. Gleeson, entitled "Untreated Syphilis in the Male Negro. A Prospective Study of the Effect on Life Expectancy."

• • •

The problem of variations in sex ratios at birth has long intrigued many students. In this issue Robert J. Myers presents a paper "The Effect of Age of Mother and Birth Order on Sex Ratio at Birth." The author uses data for the United States

for the years 1942-1950. The investigation began with the year 1942 because this was the first year in which births of each sex were cross-classified by age of mother and order of birth.

• • •

There has been a great increase of induced abortions in Japan during the past six years. In the hope of securing a better understanding of this problem Dr. Yoshio Koya and his associates at the Department of Public Health Demography, Institute of Public Health, Tokyo, conducted a survey of small but intensive coverage among a sample of 1,382 married women "who had their first induced abortion. . . [under]. . . the Eugenic Protection Law during the period August 1, 1949 to July 31, 1950." The Study is concerned with the relation of induced abortions to size of community, age, and number and sex of living children. A report on the Study appears in this issue under the title "A Study of Induced Abortion in Japan and Its Significance."

• • •

In a paper "The Relationship of Family Size in Two Successive Generations" John F. Kantner and Robert G. Potter, Jr. utilize Indianapolis Study data concerning fertility of the couple in relation to number of brothers and sisters of the wife and husband. The analysis is presented as a testing of one facet of the Indianapolis Study hypothesis that family and childhood situations affect fertility. The article is the twenty-fourth of a series of reports appearing under the general title "Social and Psychological Factors Affecting Fertility."

ON THE ASSOCIATION BETWEEN HEALTH AND SOCIAL PROBLEMS IN THE POPULATION

II. THE INFLUENCE OF MEDICAL CARE PROBLEMS

ANTONIO CIOCCO, PAUL M. DENSEN, AND
DONOVAN J. THOMPSON¹

IN THE preceding paper of this series² we examined data on a sample of families in the Arsenal Health District of Pittsburgh to determine the extent to which families with health problems, as defined, have social-welfare problems, i.e., are known to the social agencies of the community. These families had been canvassed in July, 1951, and again in June, 1952. In the total sample of 2,370 families, 231, or nearly 10 per cent, were currently in contact with agencies, i.e., were "active cases" between June, 1950, and December, 1951; 504, or approximately 21 per cent, had had contact with social agencies prior to June, 1950.

Among families with reported illnesses, accidental injuries and hospitalizations in both surveys, 12 per cent were currently in contact with social agencies in contrast to only 5 per cent among families with no reported illness, accident, or hospitalization in either survey. When consideration of contact is not limited to active cases, it was found that 43 per cent of the families in the first group were known to the agencies, while in the second group this figure is only 28 per cent.

Following our expressed intention to report systematically the steps taken in the study of the problem of association between the health status of the families of a community and the number and kinds of their problems that have required attention by community agencies we shall discuss in this paper data bearing on the nature of these problems. In pursuing further the central question as to whether or not families with health

¹ From the Department of Biostatistics, Graduate School of Public Health, University of Pittsburgh. This investigation was supported in part by a research grant from the National Institutes of Health, U. S. Public Health Service.

² A. Ciocco, P. M. Densen, and D. G. Horvitz. *Milbank Memorial Fund Quarterly*, July, 1953, xxxi, p. 265.

problems have more social-welfare problems than those without, thought must be given to the possibility that the observed association may simply be a reflection of the activities of social agencies in providing medical care. On the other hand, the association may come about through the operation of other factors which result in a larger number of families "known to social agencies" among families with health problems. We have, therefore, examined our data to determine how much of the association observed could be considered as due directly to sickness as an immediate requirement for assistance from social agencies. The degree to which this possibility actually exists will determine what significance to attach to the association. This paper presents the findings on this point.

MATERIAL AND METHOD

The sources and the methods of collecting the data have all been described in detail in earlier publications. The basic data presented in this paper relate primarily to 231 families who were known to social agencies and were active cases between June, 1950, and December, 1951, although the data on 504 additional families whose cases were closed on the books of the agencies prior to June, 1950, are also examined. For all the families, we wish to determine how much of the relationship between health and social-welfare status is due to the frequency of medical care problems which are the main reason for contact with the social agency.

In classifying the reasons for contact we have utilized the system of reporting developed by the Family Service Association of America. On the basis of this system we have classified the problems into the following major categories: I. Family (marital, parent-offspring, other); II. Behavior (juvenile delinquency, adult delinquency, other juvenile and adult behavior problems); III. Employment (unemployment and other); IV. Medical Care; V. Other.

NATURE OF SOCIAL-WELFARE PROBLEMS

The frequency of various categories of social-welfare prob-

CATEGORY OF PROBLEM	FAMILIES	
	Number	Per Cent
Medical Care, Only	62	26.8
Behavior and Family, Only	79	34.2
Employment, Only	13	5.6
Medical Care, Behavior and Family	20	8.7
Medical Care, and Employment	30	13.0
Behavior and Family and Employment	8	3.5
Medical Care, Behavior and Family and Employment	19	8.2
ALL	231	100.0

Table 1. Social-welfare problems among Arsenal study area families known to Pittsburgh social agencies. Cases open June, 1950-December, 1951.

lems among the 231 families in contact with social agencies between 1950 and 1951 is shown in Table 1. The Behavior category has been combined with the Family category because of smallness of numbers.

The data of Table 1 show that medical care problems alone or in combination with other classes of problems occur in more than half of the families. Behavior and family problems, alone or in combination with other problems, are found also in approximately half of the families. In sum, these broad classes of problems constitute the most frequent reasons for which assistance from the social agencies has been requested.

We may examine the medical care problems in terms of major groups of health conditions to which they are alleged to be related according to the records of the agencies. The data on this point, shown in Table 2, reveal that among families currently in contact with social agencies for medical care problems only or for these and employment problems, the most frequent reason for the medical care problem is chronic illness. On the other hand, pregnancy is the most frequent reason for the majority of medical care problems among families in which these and behavior and family problems are the stated reasons for contact with social agencies.

The relationships shown in Table 2 do not of themselves

REASON FOR MEDICAL CARE PROBLEM SHOWN IN AGENCY RECORD	NUMBER OF FAMILIES WITH SOCIAL WELFARE PROBLEM				
	Medical Care, Only	Medical Care, and Family, and Behavior	Medical Care and Em- ploy- ment	Medical Care and Behavior and Family and Employ- ment	Total
Mental and Allied Disorders	5	2	3	3	13
Physical Handicaps	4	1	1	1	9
Chronic Disease and Old Age	44	2	16	4	66
Acute Illness and Accidents	4	4	6	2	16
Pregnancy	5	11	2	9	27
TOTAL	62	20	30	19	131

Table 2. Reasons for medical care problems among families in contact with Pittsburgh social agencies. Arsenal study area. Cases open June, 1950-December, 1951.

constitute a true measure of the association between health and social welfare problems. Such relationships could be merely an indication of the kinds of illnesses that occur to persons having the age and sex characteristics of persons in contact with social agencies for the stated reasons. The table provides no information on the kinds of illnesses among persons not having contact with the social agencies. Nevertheless the data do provide some clues as to how such association might come about if it exists. Thus, chronic illness affects the employability of the individual, so that we would expect an association resulting from the sequence: chronic illness—employment problem. Or, the association between pregnancy and behavior and family problems could result from a sequence in the reverse order: Behavior and family problems—pregnancy—medical care problems. Whatever the sequences may be, the main purpose of our study of the association between health status and social-welfare status is to examine further the elements which are possibly related to the association in order to identify the patterns by which the sequences of events result in the association noted.

SOCIAL-WELFARE PROBLEMS	HEALTH STATUS							
	All Families in Sample		No Health Problems Survey I and II		Health Problems Survey I or II		Health Problems Survey I and II	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
All Families in Arsenal Area Sample	2,370	100.0	508	100.0	915	100.0	947	100.0
Known to Social Agencies— Cases Open 6/50–12/51	231	9.7	26	5.2	87	9.5	118	12.5
1. Medical Care, Only	62	2.6	6	1.2	27	3.0	29	3.0
2. Behavior and Family, Only	79	3.3	12	2.4	34	3.7	33	3.5
3. Employment Only	13	.6	4	.8	4	.4	5	.5
4. Medical Care, Behavior and Family	20	.8	—	—	8	.9	12	1.3
5. Medical Care and Employment	30	1.3	2	.4	7	.8	21	2.2
6. Behavior and Family and Employment	8	.3	1	.2	2	.2	5	.5
7. Medical Care, Behavior and Family and Employment	19	.8	1	.2	5	.5	13	1.4

Table 3. Health status and category of social-welfare problems. Arsenal study area. Families known to Pittsburgh social agencies with cases open June, 1950–December, 1951.

HEALTH STATUS AND CATEGORY OF SOCIAL-WELFARE PROBLEMS

The difficulties inherent in understanding the meaning of the observed association between health and social-welfare status are further brought out when we examine the data of Table 3 and Figure 1. This table presents the frequency with which families with health status as defined from our surveys have had contact during 1950–1951 with the social agencies for the several categories of social-welfare problems.

In Table 3 we note that there are families with medical care problems among those with no health problems according to our surveys. This is due in part to differences in definition of health problems as used on the surveys and as stated by the agencies. Included among the nine families with medical care problems and no health problem there are two for whom pregnancy is the reason for medical care although pregnancy is

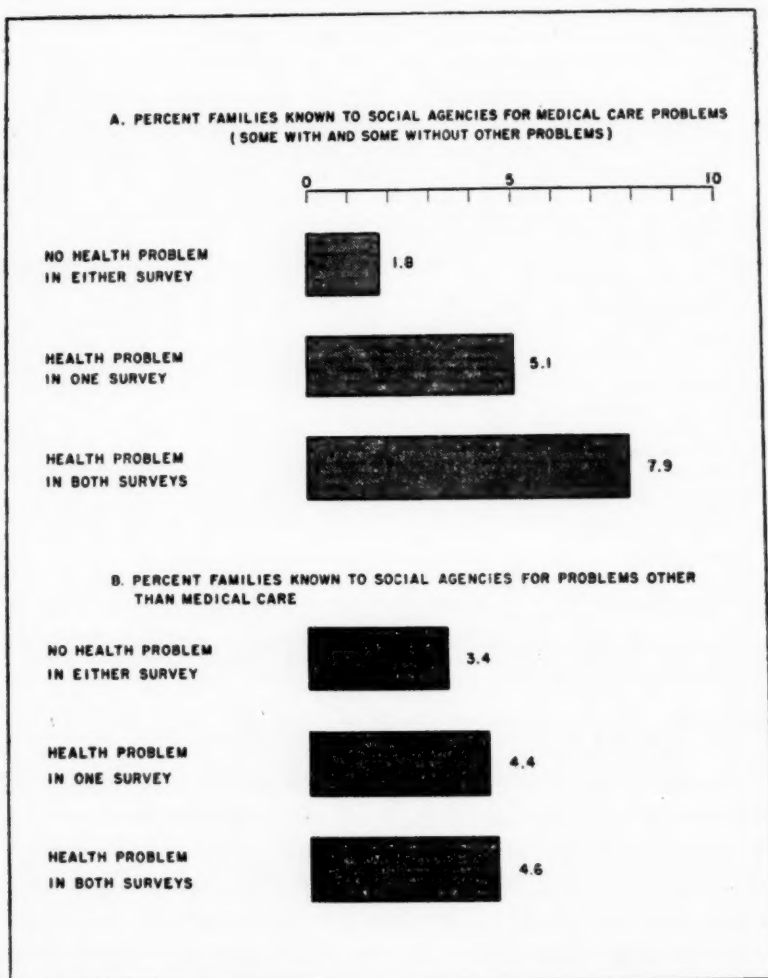


Fig. 1. Health status on survey, and social-welfare problems. Per cent families known to social agencies for medical care problems (some with and some without other problems).

not included as a health problem in the classification of health status. Among the remaining seven families, the medical care problems are related to mental and allied conditions in three, and chronic diseases associated with old age in four. Thus, we see reflected here the inability to obtain from household

canvasses data on conditions which have social stigma or which are not regarded as disease entities.

The important findings apparent in Table 3 and Figure 1 are that among the families with health problems approximately 8 per cent have contact currently with social agencies for medical care alone or in combination with other reasons. In contrast, only 2 per cent of the families with no health problems are in contact with social agencies for these reasons. The difference between the two groups of families is not so marked when we examine the frequency of contact with social agencies for behavior, family or employment problems without medical care problems. Among families with health problems in both surveys 4.6 per cent had contact with the social agencies for these reasons compared to 3.4 per cent with no health problems in either survey. Thus, the greatest difference between families who have no health problems in either survey and those that have health problems in both surveys is found for social-welfare problems which include medical care. On this basis, we could infer that the observed association is primarily due to medical care requirements of persons who have illnesses and turn to social agencies, and that if social agencies were not involved in providing assistance for medical care there would be little or no association.

Before such an inference is drawn it is well to examine its implications further. If all of the observed association is due to the existence of a medical care component in the program of the agency, then when families in contact with social agencies for reasons other than medical care are compared with families not known to the social agencies, the frequency of health problems (as found in the surveys) should be the same for the two groups. Furthermore, the frequency of health problems should be the same for both the families known to the social agencies for medical care problems only and those in contact for medical care problems in combination with other types of problems.

That neither of these hypotheses is correct is brought out by the data of Table 4 and Figure 2. It is seen in Figure 2 that the

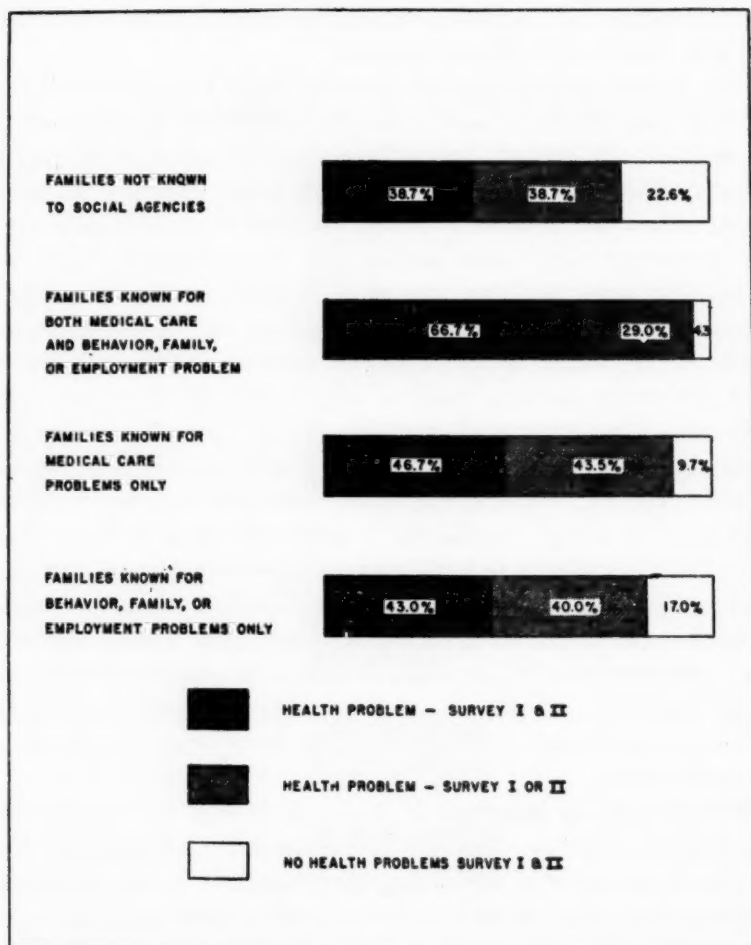


Fig. 2. Health status among families known to social agencies for designated class of social-welfare problem and health status among families not known to social agencies.

proportion of families having health problems in one or both surveys is greater among those families known to the social agencies for behavior, family or employment reasons than among families not known to social agencies. Furthermore, the contrast with the families not known to social agencies for the group having medical care problems only is different from that

SOCIAL WELFARE STATUS		HEALTH STATUS			
Family, Behavior and Employment Problems	Medical Care Problems	No Health Problems Survey I and II	Health Problems Survey I or II	Health Problems Survey I and II	Total
No	No	482 22.6% ^a	828 38.7%	829 38.7%	2,139
	Yes	6 9.7%	27 43.5%	29 46.7%	62
Yes	No	17 17.0%	40 40.0%	43 43.0%	100
	Yes	3 4.3%	20 29.0%	46 66.7%	69
TOTAL		508 21.4%	915 38.6%	947 40.0%	2,370

^a All percentages expressed in terms of the row totals.

Table 4. Families of Arsenal study area classified by health status and two types of social welfare problems (data of Table 3).

for the group having medical care problems in combination with other problems.

Although the differences for some of the comparisons in Figure 2 are likely to occur by chance, it will be noted that they are consistent in direction. Taken as a whole the data of Table 4 show that the frequency of families with behavior, family, and employment problems is greater among families found to have health problems on the surveys than would be expected by chance alone even where medical care status in the agencies records is taken into consideration.³

³ The likelihood ratio criterion λ (see, e.g. Mood, A. M.: INTRODUCTION TO THE THEORY OF STATISTICS, p. 281., McGraw-Hill, 1950) was used in making a significance test. The hypothesis tested was that the distribution of the families in the two-way classification, medical care status versus health status, does not depend upon the classification of families with respect to behavior, family, and employment problems. The 2,370 families in Table 4 were regarded as a sample from a multinomial population with cell probabilities $P_{ijk} = P_i, P_r$, i.e.: the probability that a family falls in a particular one of the six cells obtained when health status and presence or absence of medical care problems are cross tabulated (p_{ij}) is not affected by the family's status with respect to behavior, family or employment problems (p_r).

For large samples $-2 \log \lambda$ is approximately distributed as X^2 and the test in this instance was made by reference to the X^2 table with 5 degrees of freedom. The observed value of $-2 \log \lambda$ was beyond the 1 per cent point of the X^2 distribution resulting in rejection of the hypothesis.

Further evidence on this point is obtained by examining in greater detail the records of families in which a medical care problem and some other problem are found together to determine whether or not the medical care problem brought the family to the social agency. Among the sixty-nine families in contact with the social agencies for medical care and some other reason, fifty had been brought to the attention of the social agency primarily for a medical care problem and the remainder primarily for other reasons.

Addition of the fifty families to the sixty-two with medical care problems only, and of the nineteen to the 100 with other problems only, allows us to segregate the 231 families into two groups on the basis of the *primary* reason for contact: (1) Medical Care Problem, (2) Other, *i.e.*: Behavior, Family and Employment Problems. The frequency with which these two groups of families are found among the families with no health problem in either survey, with health problem in one or the other survey, with health problem in both surveys is summarized in Table 5 and shown in Figure 3.

It is seen from Table 5 that the percentage of families in contact with the social agencies primarily for medical care problems increases from 1.8 among families with no health problem

Table 5. Health status and social-welfare problems that first brought family to social agencies. Arsenal study area families known to Pittsburgh social agencies with cases open June, 1950-December, 1951.

PRIMARY-SOCIAL WELFARE PROBLEMS	HEALTH STATUS							
	All Families in Area Sample		No Health Problems Survey I and II		Health Problems Survey I or II		Health Problems Survey I and II	
	Num-ber	Per Cent	Num-ber	Per Cent	Num-ber	Per Cent	Num-ber	Per Cent
All Families in Arsenal Area Sample	2,370	100.0	508	100.0	915	100.0	947	100.0
Known to Social Agencies—								
Cases Open 6/50-12/51	231	9.7	26	5.2	87	9.5	118	12.5
Medical Care	112	4.7	9	1.8	41	4.5	62	6.5
Family and Behavior								
Employment	119	5.0	17	3.4	46	5.0	56	6.0

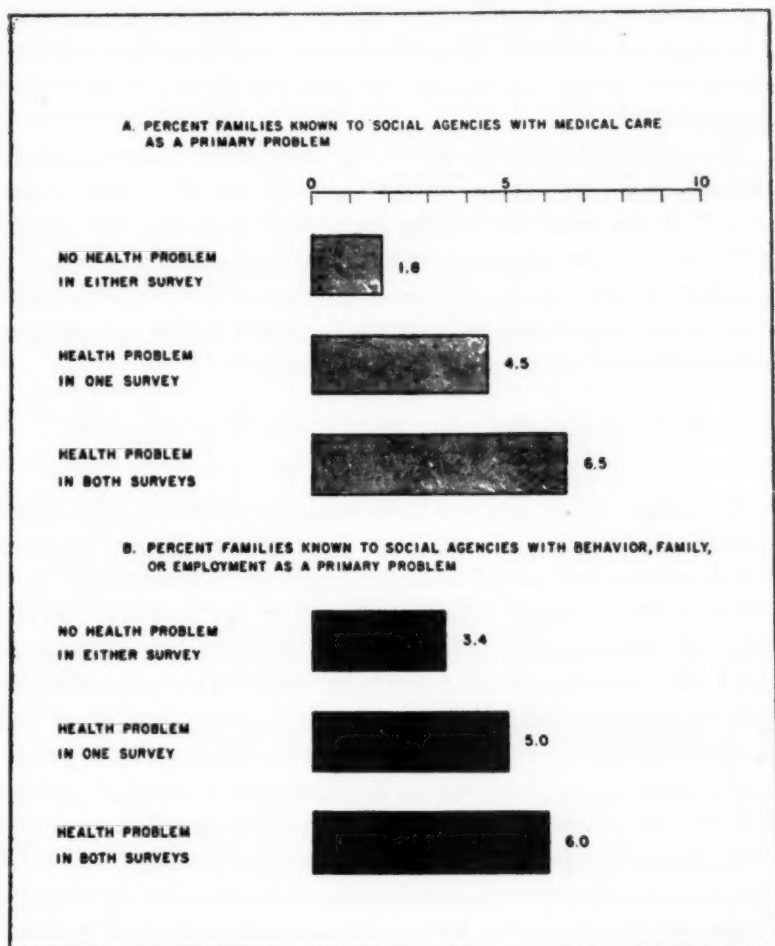


Fig. 3. Health status on survey, and primary social-welfare problems. Percent families known to social agencies with medical care as a primary problem.

in either survey to 6.5 among families with health problems in both surveys. A parallel increase is observed in the percentage of families whose contact with the social agencies was initiated because of some problem other than medical care. Among families with no health problem 314 per cent had contact with social agencies primarily for behavior, family or employment prob-

lems, while among families with health problems in both surveys this percentage is 6.0. If medical care problems were entirely responsible for the association one would not expect any trend of this kind.⁴

The inference that the observed association between health and social-welfare status is due entirely to the medical care aspect of the activities of the social agencies does not appear justified. On the contrary, it appears that more families with health problems are known than families without health problems when the reason for contact with the social agencies involves other than the need for medical care.

NATURE OF THE PROBLEM IN PRIOR CONTACT WITH SOCIAL AGENCIES

The examination of cases "currently" in contact with social agencies represents an analysis of the association between health status and social-welfare status as it exists at a particular point in time. This association must, however, be the result of the operation of many forces over some time interval. Until the sequence of events which leads to the observed association is more fully understood, the true significance of any observed association remains a matter for conjecture.

The analysis of the data on families who have had contact with the social agencies prior to 1950 should provide some clue to the sequence of events leading to associations between health and social-welfare status. Such analysis must take into account the length of time families have been in existence and "at risk" of coming into contact with social agencies. The methods by which this may be done are being explored. In the meantime,

⁴ If we regard the families with health problems on both surveys and those with no health problems on either survey as samples from two populations we may test the hypothesis that the observed difference in proportions in contact with the agencies for medical care problems represents only sampling fluctuation for samples drawn from two populations with a common value for this proportion. The observed difference, 4.7 per cent, leads to a normal deviate of 4.3 which falls beyond the 1 per cent point of the normal distribution resulting in rejection of the hypothesis. A similar test of the difference in proportions of families contacting the agencies for behavior, family and employment problems in the two groups, 2.6 per cent, also leads to rejection of the hypothesis at the 1 per cent level of significance.

SOCIAL-WELFARE PROBLEMS	HEALTH STATUS							
	All Families in Sample		No Health Problems Survey I and II		Health Problems Survey I or II		Health Problems Survey I and II	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
All Families in Arsenal Area Sample	2,370	100.0	508	100.0	915	100.0	947	100.0
Known to Social Agencies—								
Cases Closed 6/50	504	21.3	83	16.3	195	21.3	226	23.9
1. Medical Care, Only	65	2.7	4	0.8	30	3.3	31	3.3
2. Behavior and Family, Only	233	9.8	44	8.7	86	9.4	103	10.0
3. Employment, Only	20	0.8	5	1.0	3	0.3	12	1.3
4. Medical Care and Behavior and Family	94	4.0	14	2.8	38	4.2	42	4.4
5. Medical Care Employment	21	0.9	1	0.2	13	1.4	7	0.7
6. Behavior and Family and Employment	42	1.8	9	1.8	18	2.0	15	1.6
7. Medical Care and Behavior and Family and Employment	29	1.2	6	1.2	7	0.8	16	1.7

Table 6. Health status and social-welfare problems. Arsenal study area. Families known to Pittsburgh social agencies with cases closed by June, 1950.

we shall examine the data at hand to inquire whether or not medical care problems account for the differences observed among families with contact prior to 1950 when they are classified according to health status.

The results of this examination are summarized in Table 6 in which families with no health problems are compared with those having health problems in one or the other or both surveys. It is found that:

(1) In the former group fewer families had contact with social agencies in the past than in the latter.

(2) Also, fewer families in the former group had contact with the agencies for behavior and family problems alone than in the latter group.

(3) There does not appear to be much difference between the two groups with respect to employment problems or a combination of employment and behavior and family problems.

In sum, it would appear that a larger number of families with health problems have had contact with social agencies in the past for reasons connected not only with medical care problems but also for behavior and family problems. These findings are consistent with those of the preceding section and, in addition, point to the potential value of inquiring further into the meaning of the past history of behavior and family problems for current health problems.

DISCUSSION

In the introduction to the first paper of this series it was pointed out that a relationship is expected to exist between health and "socio-economic" status from the many studies which indicate that, (1) some illnesses are found more frequently, have longer duration of disability in one or the other social or economic segments of the population, (2) a large proportion of persons on public assistance has health problems. It was also pointed out that to clarify further the relationship between social and health characteristics, the specific factors which are involved in this relationship should be identified and their mode of operation determined.

It has been shown that among families with health problems, as determined from a household canvass of a sample of the population, relatively more are known to social agencies than among families without health problems. In part this association results from the medical care activities of the social agencies. However, it has also been found that more families with health problems have contact with social agencies for reasons other than medical care than do families without health problems. The observed association, therefore, appears not to be solely the reflection of the medical care activities of the social agencies but to some extent must be regarded as independent of these activities and programs.

The significance of these findings cannot be assessed without further knowledge of the dynamics which result in the association. Such knowledge requires information on the sequence of

events which produces the association. Do health problems precede social-welfare problems or vice versa? Is the sequence always the same? If not, in what kinds of situations does one precede the other? These are some of the questions which it is hoped to explore further.

UNTREATED SYPHILIS IN THE MALE NEGRO

A PROSPECTIVE STUDY OF THE EFFECT ON LIFE EXPECTANCY¹

J. K. SHAFER, M.D.;² LIDA J. USILTON, SC.D.;³ AND GERALDINE
A. GLEESON, A.B.⁴

DETERMINATION of the quantitative effect of a disease on the life expectancy has posed numerous difficulties, both statistical and medical. This is more apparent in chronic disease than in acute disease where determination of death or survival is, relatively speaking, revealed without delay.

In discussion of chronic disease, with limited funds available for public health activities, the determination of which diseases shall be made the target of concerted effort often is based on the economic effects of disease, that is, the economic effects as they relate to the need for hospitalization or care of the individual out of public monies. Certainly more concern should be given to the fact that life has value, happiness, and dignity which are greater in health than in disease.

The problems inherent in answering quantitative questions relating to the lethal effects of chronic disease have been reviewed repeatedly (1-3). They will not be discussed here other than to state that one of the chief obstacles in such determinations is that data have to be secured on the basis of *retrospective* rather than *prospective* bases.

THE SYPHILIS PROBLEM

Syphilis is a disease with an acute span of about two years

¹ From the Venereal Disease Program, Division of Special Health Services, United States Public Health Service, Washington 25, D. C.

This article is being published simultaneously in the July issue of *Public Health Reports*. It is one of a series on untreated syphilis in the male Negro which the Venereal Disease Program, Division of Special Health Services, plans to assemble into a monograph. Single copies of the monograph will be made available upon request to the Venereal Disease Program, Division of Special Health Services, United States Public Health Service, Washington 25, D. C.

² Medical Director, Assistant Chief, Division of Personnel, United States Public Health Service; formerly, Chief, Venereal Disease Program.

³ Public Health Administrator, Venereal Disease Program.

⁴ Statistician, Venereal Disease Program.

and with chronicity which may persist throughout the life span. Most of its lethal and crippling manifestations occur during the first fifteen to twenty years of the chronic period. It has been the subject of extensive study; not only as a disease, but also in relation to the social, educational, and economic aspects of the lives of those infected with it and of the community in which it is found. The development of the structure of the present day national venereal disease control program reflects the results of this study, in spite of important areas of ignorance which still remain.

Realization of the widespread prevalence of syphilis and the related venereal diseases was responsible for the first nationwide program in public health control of venereal diseases. These diseases accounted for one of the chief causes of draft rejection in the first World War, and this fact gave impetus to establishment of the control program. The program collapsed soon after the end of the war, but over the next fifteen years the ground was prepared for epidemiologic, morbidity, and mortality studies, and for determination of effective methods of diagnosis and cure. These studies were needed to provide the stimulation and justification for another attempt to control the spread of syphilis and the other venereal diseases. This program was initiated in 1938 and still is being successfully carried on.

A recent study on syphilis mortality (4) during the period of the Fifth Revision of the International Lists of the Causes of Death, 1939 through 1948, shows that the reduction in total syphilis mortality during the ten years following the initiation of the control program in 1938 proceeded at a faster rate than the reduction in deaths from all causes. The number of syphilis deaths was reduced approximately 41 per cent between 1939 and 1948, and the syphilis death rate was reduced about 47 per cent in the same period. The progress made in reducing syphilis mortality during this ten-year period has been equivalent to the progress made against death from all causes in the forty-nine-year period from 1900 through 1948.

In spite of the vast volume of studies on syphilis found in the medical literature of both this continent and Europe relative to all aspects of the disease, there were, in 1930, no accurate data relative to the effect of syphilis in shortening of life. Of course, the facts relative to the occurrence of central nervous system syphilis, cardiovascular syphilis, and congenital syphilis were well known from the point of view of diagnosis and pathologic findings once the disease had become manifest. However, there was no accurate idea about the natural history of the disease leading up to these complications. This information was necessary in order to evaluate the effectiveness of programs of public health control with a reasonable degree of understanding of the natural history of the disease.

THE BRUUSGAARD STUDY

The findings of Bruusgaard of Norway on the results of untreated syphilis became available in 1929 (5). Boeck, chief of the Dermatology and Syphilology Clinic at the University of Oslo, treated 2,181 patients with early syphilis by hospitalization and simple, symptomatic remedies. He kept them under hospital care until all of the signs and symptoms of the acute, infectious stage had passed. He did not use arsenicals when they became available, nor did he use even mercury, so that his patients were allowed to run the normal course of syphilis essentially uninfluenced by therapy. By virtue of the size of the country, the centralization of records, and the workings of Norway's venereal disease control system it was possible to secure follow-up data upon a large portion of this group of patients.

Bruusgaard's analysis showed outcome of the disease in a group of 473 patients at three to forty years after infection. For the first time, data were available to suggest the probability of spontaneous cure, continued latency, or serious or fatal outcome. Of the 473 patients included in Bruusgaard's study, 309 were living and examined, and 164 were dead. Among the 473 patients, 27.7 per cent were clinically free from symptoms with the Wassermann negative, 14.8 per cent had no clinical

symptoms with the Wasserman reaction positive. On the basis of diagnoses made at examination or at autopsy, 14.0 per cent had cardiovascular disease, 2.8 per cent were found to have paresis, and 1.3 per cent were diagnosed as having *tabes dorsalis*.

Bruusgaard's findings met with immediate objections, many of which were based on the validity of the basic data. Some of the questions regarding the analysis included; how accurate was the original diagnosis in many cases; how many of the cases were diagnosed and treated prior to the discovery of the dark-field microscope; was there any assurance that the course of disease in those followed was the same as in those lost from observation? (It should be noted that the Bruusgaard material recently has been subjected to an intensive review with clinical examination of most of the known survivors, and subsequent findings will be published (6).

The shortcomings of Bruusgaard's work and of other retrospective studies, the most complete of which is that of Rosahn (7), have pointed up the need for other long-term studies. These should be planned to overcome the objections to the earlier studies and to provide answers related to the area and population groups in which the problem is concentrated.

LIFE TABLE TECHNIQUE APPLIED TO SYPHILIS

One of the first studies in which the life table technique was used to measure the effect of syphilis in shortening of life was published in 1937 (8). The mortality experience of the population included in the Cooperative Clinical Studies was used as a basis for this study. It was found that the life expectancy of males with acquired syphilis is shortened from that in the general population from ages 30 to 60 by 17 per cent in the white males and 30 per cent in the Negro males. Any comparison of the reduced life expectancy in this study with the findings in the present study is precluded, because of disproportionate changes in the life expectancy of population groups during the fifteen-year interim, 1937-1952.

BACKGROUND OF TUSKEGEE STUDY

In the late 1920's various of the Foundations (Rockefeller, Rosenwald (9) etc.) began their studies of health conditions in the South which were to eventuate in the development of local health units. One of the most striking findings in the early surveys of disease prevalence was the high rate of syphilis among the majority of the Negro groups studied. In one of the study areas (Macon County, Ala., home of the Tuskegee Institute) initial efforts at control of syphilis were followed by further moves on the part of the United States Public Health Service to bring diagnosis and treatment to the population. With the finding of high prevalence of syphilis in the survey and with certain other factors apparent in the community it became evident that it might be possible to institute in this region a prospective—in contrast to a retrospective—study of the results of untreated syphilis in the Negro male. Such a study was needed to assist in the planning and execution of the national venereal disease control program which was then being planned for a later time.

While details of the program are available elsewhere (10-12), the plan may be summarized by stating that it was decided to confine the study group to males so that there would be no problem of the transmission of congenital syphilis. The study group patients were selected as having syphilis on the basis of the best serologic and clinical knowledge available at the time. A competent syphilologist spent almost a year in residence to set up the study group. The control patients were selected to provide a valid matching group from the same socioeconomic and age groups. Documentation of the validity of the control group from the socioeconomic standpoint is offered in another report (13).

In order to assure careful observation of the group, a Negro nurse, resident of the community and just out of training, was employed to take local responsibility for follow-up of all patients, both syphilitic and nonsyphilitic, under the direction of the local health officer (14).

Finally, in order to provide maximum validity to the findings, arrangements were made to secure autopsies on all deceased patients.⁵ On completion of each of the gross examinations, specimens were sent to the Pathology Division of the National Institutes of Health for microscopic study. The first report on the findings of the postmortem examinations is being prepared (15).

A few patients, both syphilitic and control, have migrated from the area, particularly to the North, but even so, a sizable portion of those patients have been followed for examination and a few, even for autopsy. The characteristics of the group, though, have been such that most have remained where they were originally examined; both control and syphilitic groups have continued to enjoy essentially the same kind of life (13) and the same types of medical and public health care. The same nurse and pathologist-radiologist have been working with and observing the two groups since they originally were selected for study.

It is evident, then, that these patients provide an unusual group: the original selection, the physical and serologic examinations through the years, and the postmortem studies were based upon knowledge of the desideratum to supply valid information concerning certain aspects of the chronology of a chronic disease. It has been possible to carry out the study in accordance with the original experimental design. Now, the results of the twenty-year physical examination of the group and certain other aspects of the study are available to add to the interim observations (16, 17).

The amount of specific antisyphilitic treatment given (18) has been insufficient to modify significantly the course of the disease, so that comparison of the life expectancy of the two groups is a valid procedure. Furthermore, serologic study at this last examination included performance of *Treponema pallidum* immobilization (TPI) test, a laboratory procedure

⁵ Fees for autopsies and other expenses which official agencies were not able to assume were paid for by the Milbank Memorial Fund.

which indicates with a high degree of accuracy the fact of existence of syphilis in the latent stage at some time in the patient's life without regard to whether or not specific therapy has been given (19). Results of this test indicated a high degree of accuracy in the original diagnoses. Thus, the comparison of life expectancy can be considered to be one between two comparable groups, differing only in the presence or absence of syphilis at the time when the study was initiated.

STATISTICAL METHOD AND ANALYSIS

The present study group consists of 408 untreated syphilitic and 192 nonsyphilitic patients, all of whom were entered in the study during 1932-1933 and who maintained their original status relative to the presence or absence of syphilitic infection. Of the syphilitic patients 165 (40.4 per cent) have died and of the nonsyphilitic patients 51 (26.6 per cent) have died since the beginning of the study through 1952. Approximately 60 per cent of these 216 patients have been examined postmortem.

In Table 1, the life expectancy of the nonsyphilitic individuals included in this study is shown in comparison to the expectancy for all nonwhite males as presented in life tables prepared by the National Office of Vital Statistics. These tables

Table 1. Life expectancy for the nonsyphilitic individuals in the Macon County study group, and for all nonwhite males in the United States, 1950, by age-group.

AGE-GROUP 1932-1933 (in Years)	LIFE EXPECTANCY IN YEARS	
	Nonsyphilitic Individuals in Macon County Study Group	All Nonwhite Males in United States, 1950
25-29	41.6	39.7
30-34	38.2	35.5
35-39	34.1	31.5
40-44	29.7	27.5
45-49	25.2	23.8
50-54	20.7	20.5
55-59	16.4	17.6
60-64	12.3	15.2
65-69	8.4	13.3
70-74	4.5	11.1

were based on the 1950 mortality experience for the entire country (20). The similarity of the figures within each age-interval group indicates that the experience of the nonsyphilitic group in this study is sufficiently stable to serve as a measure of normal life expectancy.

The basic data used in the computation of the life expectancies of the two groups consists of (a) the number of deaths occurring in each group during the twenty years, 1933 through 1952, the deaths being tabulated by age-interval of occurrence, and (b) the total number of patient years of observation contributed by the individuals in each age-group during the period under study (Table 2). Age-specific mortality rates were obtained by relating the number of deaths occurring within a particular interval to the number of patient years of observation within the interval. Due to the relatively small numbers involved, it was necessary to combine the single years into five-year age groups for ages 25 through 74 years and to exclude the data for ages 75 years and older. From Table 2 (column 3) it is evident that the mortality rate for the untreated syphilitic group is higher than that for the nonsyphilitic group in each of the five-year age intervals.

It will be noted that the rates for both the syphilitic and the nonsyphilitic groups display a general upward trend with age, as would be expected, but show the lack of stability characteristic of rates computed from small numerical values. To overcome this instability and to provide for the interpolation of rates for single years of age, necessary for the construction of the life tables, the rates for the five-year age groups were fitted to cubic parabolas ($a + bx + cx^2 + dx^3$). The resulting values are shown in column 4 of Table 2. These adjusted rates were applied successively (by single years of mortality experience) to a theoretical population of 100,000 persons alive at age 25. As the mortality rates were applied, the number of survivors at each age-year, 25 through 74, was obtained by subtracting the number who would have died in the theoretical population had they been exposed to the mortality rates computed from the

AGE INTERVAL IN YEARS	UNTREATED SYPHILITIC PATIENTS					
	Mortality Experience			Application to Theoretical Life Table Population		
	Patient Years of Observation	Number of Deaths Occurring	Number of Deaths per 1,000 Years of Observation	Average Number Dying during Inter- val, of 1,000 Alive at Beginning of Interval	Number Surviving at Beginning of Age-Period of 100,000 Alive at Age 25	Life Expectancy Through Age 74 of Those Individuals Surviving to Age-Period
	(1)	(2)	(3)	(4)	(5)	(6)
25-29	305.2	3	9.8	12.2	100,000	34.73
30-34	565.0	9	15.9	10.4	94,036	31.78
35-39	724.5	6	8.3	10.2	89,203	28.37
40-44	884.5	7	7.9	11.7	84,713	24.75
45-49	832.3	14	16.8	15.1	79,846	21.10
50-54	838.2	23	27.4	20.6	73,975	17.57
55-59	763.8	15	19.6	28.4	57,203	14.07
60-64	666.0	24	36.0	38.7	58,166	10.86
65-69	442.0	27	61.1	51.7	47,727	7.68
70-74	219.8	14	63.7	67.6	36,578	4.25

Table 2. Abridged life tables based on mortality experience of untreated syphilitic and presumably nonsyphilitic patients, Negro males 25 through 74 years of age, Macon County study group, 1933-1952.

study groups. The number of survivors was cumulated to represent the patient years of life at each single-year interval. At this point, the patient-years were combined into five-year intervals to serve as base figures in the computation of the life expectancy of each five-year age group. The figures in column 5 of Table 2 represent the number of individuals surviving to the beginning of each five-year age interval rather than the total number of individuals to which the rates were applied during the five-year interval. The average number of years of life through age 74 remaining to individuals reaching a given age is shown in column 6, and is presented graphically in Figure 1.

The last two columns in Table 2 represent the number of years and percentage of reduction in the life expectancy among individuals in the syphilitic group. It will be noted from the table that the difference in the average number of years of expected life for nonsyphilitic and syphilitic patients decreases gradually from the youngest age-interval, 25 through 29 years, to the oldest, 70 through 74 years. This is to be expected since

PRESUMABLY NONSYPHILITIC PATIENTS						AVERAGE REDUCTION IN LIFE EXPECTANCY OF THOSE IN SYPHILITIC GROUP	
Mortality Experience			Application to Theoretical Life Table Population				
Patient Years of Observation	Number of Deaths Occurring	Number of Deaths per 1,000 Years of Observa- tion	Average Number Dying During Inter- val, of 1,000 Alive at Be- ginning of Interval (4)	Number Surviving at Begining of Age-Period, of 100,000 Alive at Age 25 (5)	Life Expectancy Through Age 74 of Those Individuals Surviving to Age-Period (6)	Number of Years	Per Cent
(1)	(2)	(3)	(4)	(5)	(6)		
143.5	1	7.0	7.7	100,000	41.60	6.87	16.5
269.5	2	7.4	5.3	96,184	38.16	6.38	16.7
354.0	1	2.8	3.7	93,628	34.13	5.76	16.9
447.0	1	2.2	3.3	91,879	29.74	4.99	16.8
424.5	2	4.7	4.4	90,363	25.19	4.09	16.2
434.5	3	6.9	7.4	88,373	20.70	3.13	15.1
415.5	4	9.6	12.9	85,089	16.40	2.33	14.2
355.0	12	33.8	21.1	79,699	12.32	1.46	11.9
250.0	5	20.0	32.5	71,588	8.42	.74	8.8
136.5	7	51.3	47.4	60,643	4.47	.22	4.9

the effect of the natural aging processes reflected in both study groups tend to overshadow any difference due to the syphilitic process in the older age-groups. Percentagewise, however, the difference in the two groups, syphilitic and nonsyphilitic, remains fairly constant during the first five age-intervals, indicating that the life expectancy of a Negro male between the ages of 25 and 50 years, infected with syphilis and receiving no appreciable treatment for his infection, is reduced by about 17 per cent. The twelve years (1933 through 1944) of patient observation on which the original life study (18) of the patients was based yielded information that the life expectancy in the syphilitic group is reduced by 20 per cent among persons in the twenty-five to fifty year age group. It is interesting to note that the additional eight years of mortality experience available for the present study reduced the difference in life expectancy between the study groups from 20 per cent to 17 per cent.

SUMMARY

1. The rationale for and establishment of the controlled prospective study of the effect of untreated syphilis in the male Negro are discussed.

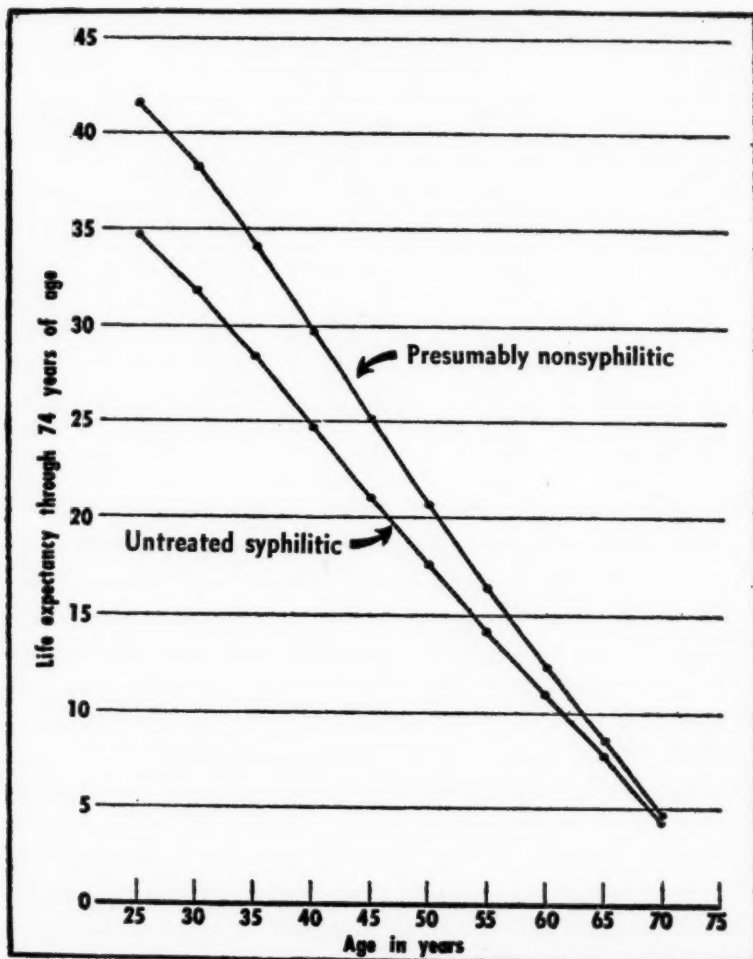


Fig. 1. Comparison of life expectancy through age 74 in untreated syphilitic and presumably nonsyphilitic patients surviving to specific age intervals, Macon County study group.

2. The prolonged nature of a chronic disease or a disease with a chronic stage, such as syphilis, necessitates long-term study of the natural history (or pathogenesis) of the disease before the effectiveness of programs for the control of the disease can be evaluated properly.

3. Based on the mortality experience among 408 untreated

syphilitic and 192 presumably nonsyphilitic patients, the general trend of mortality is higher among the syphilitic individuals between the ages of 25 and 74 years.

4. The life expectancy of an individual 25 to 50 years of age with syphilis, for which he has received no appreciable amount of therapy, is approximately 17 per cent less on the average than that of an individual in the same age interval of a non-syphilitic population.

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THE EFFECT OF AGE OF MOTHER AND BIRTH ORDER ON SEX RATIO AT BIRTH

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A QUESTION of great importance in the minds of parents-to-be is whether the new arrival will be a boy or a girl. Doctors wisely attempt to sidestep predictions on this matter, although one who is hard-pressed is safer to predict a boy because experience has shown that there will be roughly 105 or 106 boy babies for each 100 girl babies. Although this is small "odds," it is on such as this that Monte Carlo has prospered.

The relative constancy of the sex ratio at birth has been widely studied and noted. From a layman's standpoint, United States data have indicated relatively little change over the years and relatively little variation with factors such as age of mother, birth order, residence, income level, war, etc. Perhaps the most noteworthy difference, and even this seems small to a layman, is that the sex ratio at birth (used hereafter as the number of boy babies per 1,000 girl babies) is about 1,060 for white persons as against 1,025 for nonwhite persons.

There are, however, *statistically significant* differences in the ratio according to age of mother and birth order, as noted by previous studies. For instance, McMahan² observed a "tendency for the sex ratio among live births to decrease as the age of the mother increases" and "a slightly greater tendency for the first-born child to be a male than for later born children." This paper will present the results of a detailed analysis of data for the United States covering the period 1942-1950 as to the effect of age of mother and birth order on the sex ratio at birth, considering each of these two factors independently of the other. The investigation began with 1942 because before then

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² McMahan, C. A.: An Empirical Test of Three Hypotheses Concerning the Human Sex Ratio at Birth in the United States, 1915-1948. *Milbank Memorial Fund Quarterly*, July 1951, xxix, No. 3, p. 288.

data cross-classified by age of mother and birth order were not available.

Table 1 shows the sex ratio at birth for all white births in 1942-1950 (totalling some 24.2 million births after excluding

Table 1. Sex ratios of white births in 1942-1950 by age of mother and birth order.

ORDER OF BIRTH	AGE OF MOTHER						
	Under 20	20-24	25-29	30-34	35-39	40 and Over	All Ages
SEX RATIO OF BIRTHS							
1	1,068	1,067	1,068	1,064	1,060	1,075	1,067
2	1,065	1,058	1,063	1,060	1,058	1,060	1,060
3	1,057	1,053	1,056	1,049	1,054	1,053	1,053
4	1,035	1,054	1,053	1,053	1,056	1,053	1,053
5	*	1,049	1,053	1,046	1,050	1,032	1,049
6	*	1,045	1,045	1,052	1,048	1,034	1,047
7	*	1,044	1,047	1,044	1,054	1,031	1,046
8 and Higher	*	1,111	1,046	1,048	1,041	1,039	1,043
All Orders	1,067	1,062	1,061	1,055	1,053	1,046	1,060
AS PER CENT OF PROPORTION FOR ALL AGES							
1	100.1	100.0	100.1	99.7	99.3	100.7	100.0
2	100.5	99.8	100.3	100.0	99.8	100.0	100.0
3	100.4	100.0	100.3	99.6	100.1	100.0	100.0
4	98.3	100.1	100.0	100.0	100.3	100.0	100.0
5	*	100.0	100.4	99.7	100.1	98.4	100.0
6	*	99.8	99.8	100.5	100.1	98.8	100.0
7	*	99.8	100.1	99.8	100.8	98.6	100.0
8 and Higher	*	106.5	100.3	100.5	99.8	99.6	100.0
All Orders	100.7	100.2	100.1	99.5	99.3	98.7	100.0
AS PER CENT OF PROPORTION FOR ALL ORDERS OF BIRTH							
1	100.1	100.5	100.7	100.9	100.7	102.8	100.7
2	99.8	99.6	100.2	100.5	100.5	101.3	100.0
3	99.1	99.2	99.5	99.4	100.1	100.7	99.3
4	97.0	99.2	99.2	99.8	100.3	100.7	99.3
5	*	98.8	99.2	99.1	99.7	98.7	99.0
6	*	98.4	98.5	99.7	99.5	98.9	98.8
7	*	98.3	98.7	99.0	100.1	98.6	98.7
8 and Higher	*	104.6	98.6	99.3	98.9	99.3	98.4
All Orders	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* Not computed because less than 1,000 male births.

those where birth order or age of mother was not stated) by age of mother and birth order, while Table 2 gives corresponding data for nonwhite births (totalling about 3.4 million on the same basis). For all orders of birth combined, the ratio shows

Table 2. Sex ratios of non-white births in 1942-1950 by age of mother and birth order.

ORDER OF BIRTH	AGE OF MOTHER						
	Under 20	20-24	25-29	30-34	35-39	40 and Over	All Ages
SEX RATIO OF BIRTHS							
1	1,028	1,031	1,020	1,024	981	1,065	1,027
2	1,029	1,029	1,035	1,048	1,025	984	1,031
3	1,019	1,028	1,019	1,033	1,042	1,040	1,026
4	976	1,021	1,026	1,038	1,031	985	1,024
5	1,062	1,013	1,021	1,015	1,017	1,000	1,017
6	*	1,034	1,012	1,035	1,003	1,035	1,020
7	*	1,019	1,022	1,020	1,020	938	1,022
8 and Higher	*	1,014	1,018	1,018	1,009	1,017	1,015
All Orders	1,027	1,027	1,023	1,028	1,014	1,016	1,025
AS PER CENT OF PROPORTION FOR ALL AGES							
1	100.1	100.4	99.3	99.7	95.5	103.7	100.0
2	99.8	99.8	100.4	101.6	99.4	95.4	100.0
3	99.3	100.2	99.3	100.7	101.6	101.4	100.0
4	95.3	99.7	100.2	101.4	100.7	96.2	100.0
5	104.5	99.6	100.4	99.8	100.0	98.3	100.0
6	*	101.4	99.2	101.5	98.3	101.5	100.0
7	*	99.7	100.0	99.8	99.8	91.8	100.0
8 and Higher	*	99.9	100.3	100.3	99.4	100.2	100.0
All Orders	100.2	100.2	99.8	100.3	98.9	99.1	100.0
AS PER CENT OF PROPORTION FOR ALL ORDERS OF BIRTH							
1	100.1	100.4	99.7	99.6	96.7	104.8	100.2
2	100.2	100.2	101.2	101.9	101.1	96.9	100.6
3	99.2	100.1	99.6	100.5	102.8	102.4	100.1
4	95.0	99.4	100.3	101.0	101.7	96.9	99.9
5	103.5	98.6	99.8	98.7	100.3	98.4	99.2
6	*	100.7	98.9	100.7	98.9	101.9	99.5
7	*	99.2	99.9	99.2	100.6	92.3	99.7
8 and Higher	*	98.7	99.5	99.0	99.5	100.1	99.0
All Orders	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* Not computed because less than 1,000 male births.

a steadily decreasing trend with advancing age of mother although for nonwhite births there is some fluctuation around the generally decreasing trend. For all ages of mother combined, the ratio consistently decreases for white births and to some extent also for nonwhite births.

Accordingly, up to this point, the results of previous investigations are confirmed, but for proper analysis the ratios should be considered on a stratified or standardized basis, studying the ratios by age of mother for each birth order and, conversely, for each birth order by age of mother. In order to facilitate such analysis, the lower two sections of Tables 1 and 2 have been inserted. Considering white births, for each order no consistent trend seems evident with advancing age of mother (as per the middle section of Table 1) since the ratios fluctuate slightly above and below 100 per cent. On the other hand, considering each age of mother separately (as in the bottom section of Table 1), a decreasing sex ratio as the birth order rises is quite evident. For the nonwhite data in Table 2, the same relationships seem to be present although not quite so clear—especially in regard to first births for which the ratio seems lower than might be expected.

The preceding method of analysis might well be criticized on the basis that it is not precise but rather is based on general reasoning and observation. Accordingly, correlation analysis has been utilized to determine whether there are any significant trends. For each age group of mother, the correlation coefficient was computed, with the sex ratio as ordinates and the birth order as abscissas. The same procedure was repeated for each birth order, again taking the sex ratio as ordinates and age of mother as abscissas.

Because some of the cells were relatively small and, accordingly, wide fluctuations in the sex ratio occurred, it was decided to combine these data into somewhat fewer groups. Thus the criterion was set up that no cell would be used if it consisted of fewer than 10,000 male births. Accordingly, for white births, third and higher orders were combined for mothers under age

20, and for mothers aged 20-24 sixth and higher orders were combined. Correspondingly, for nonwhite births, the same combinations were made as to birth order and, in addition, the last two age groups were combined (so that the last group was 35 and over).

First, considering the stratification by order of birth, the following correlation coefficients were obtained as between age of mother and sex ratio at birth:

<i>Order of Birth</i>	<i>White</i>	<i>Nonwhite</i>
1	+ .11	-.80
2	-.53	-.01
3	-.46	+.82
4	+.35	-.45
5	-.77	-.64
6	-.40	-.03
7	-.51	-.79
8 and Higher	-.97	-.36
All Orders	-.97	-.78

Although very high inverse correlation shows up for all orders of birth combined, for the birth orders taken separately there is no indication of any consistent correlation since the coefficient ranges from positive to negative (or close to zero) for both white and nonwhite births.

Next, considering the correlation between birth order and sex ratio at birth when stratification is made by age of mother, the following results were obtained:

<i>Age of Mother</i>	<i>White</i>	<i>Nonwhite</i>
Under 20	-.97	-.84
20-24	-.90	-.55
25-29	-.94	-.46
30-34	-.80	-.51
35-39	-.84	+.04 ^a
40 and Over	-.88	"
All Ages	-.95	-.83

^a Figure computed only for ages 35 and over.

Very strong evidence of inverse correlation was obtained for white births, although this is much less so for nonwhite births. Thus for white births, the coefficient never falls below $-.80$ for any of the age groups of mother, thus indicating that the sex ratio at birth for a given age of mother decreases as birth order increases.

Still another method of somewhat more scientific analysis involves obtaining standardized sex ratios at birth for each age group of mother. This is done by assuming that for each age group the relative distribution by birth order is the same as for all ages combined, or in other words, that all such age groups have the same distribution by birth order. Based on actual sex ratios at birth for each birth order for the particular age group

Table 3. Comparison of actual and standardized¹ sex ratios of births in 1942-1950 by age of mother and birth order.

ITEM	WHITE BIRTHS			NONWHITE BIRTHS		
	Actual Ratio	Standardized Ratio ¹	Difference	Actual Ratio	Standardized Ratio ¹	Difference
BY AGE OF MOTHER						
Under 20	1,067	1,063	+4	1,027	1,015	+12
20-24	1,062	1,061	+1	1,027	1,026	+1
25-29	1,061	1,061	0	1,023	1,023	0
30-34	1,055	1,058	-3	1,028	1,031	-3
35-39	1,053	1,057	-4	1,014	1,012	+2
40 and Over	1,046	1,061	-15	1,016	1,019	-3
BY BIRTH ORDER						
1	1,067	1,067	0	1,027	1,024	+3
2	1,060	1,061	-1	1,031	1,031	0
3	1,053	1,054	-1	1,026	1,026	0
4	1,053	1,052	+1	1,024	1,014	+10
5	1,049	1,065	-16	1,017	1,026	-9
6	1,047	1,040	+7	1,020	1,015	+5
7	1,046	1,039	+7	1,022	1,009	+13
8 and Higher	1,043	1,059	-16	1,015	1,007	+8

¹ For each "age of mother" group, it is assumed that the relative distribution of mothers by birth order is the same as for all ages combined; then actual sex proportions at birth for each birth order for the particular "age of mother" group are weighted by this distribution to yield the standardized ratio. The same procedure (but, of course, correspondingly reversed) is used for standardized ratios for each "birth order" group.

of mothers, the aggregated standardized sex ratio of the group can be obtained.³ In similar fashion, standardized ratios for each birth order group may be obtained under the assumption that the relative distribution of births by age of mother is the same for all birth order groups.

Table 3 compares the actual sex ratios of births with the standardized ratios. For white births, the standardized ratios show no trend for increasing age of mother, whereas the actual ratios show a significant decreasing trend; on the other hand, both the actual and standardized ratios show a definite downward trend for increasing birth order. For nonwhite births, as in the previous analysis, the same general tendencies seem to be present as for white births although not nearly so clearly evident.

In summary, the analysis made shows, for both white and nonwhite births, a definite inverse relationship between sex ratio at birth and age of mother and between sex ratio at birth and birth order when age of mother and birth order are considered independently. However, when the analysis is properly made—by stratifying birth order when considering the effect of age of mother and vice versa—new conclusions must be drawn. There is definite indication for white births that the sex ratio at birth varies inversely with birth order and to some extent this is also the case for nonwhite births. On the other hand, the apparently similar relationship of sex ratio with age of mother is due largely, if not solely, to lower orders of birth being more predominant in births to younger mothers. In other words, birth order has a definite effect upon sex ratio at birth, regardless of age of mother, whereas age of mother appears to have relatively little effect on sex ratio at birth except insofar as there is correlation between age of mother and birth order, the latter being the controlling factor.

³ Actually, in performing the calculations, sex proportions at birth (i.e. the percentage of births that are male) must be used rather than sex ratios.

A STUDY OF INDUCED ABORTION IN JAPAN AND ITS SIGNIFICANCE

YOSHIO KOYA, M.D.¹

PART I: INTRODUCTION

SINCE promulgation of the Eugenic Protection Law in July, 1948, and the passage of liberalizing amendments in May, 1949, the number of induced abortions has increased greatly. Even if only the reported abortions were counted, the total number was 246,104 in 1949; 489,111 in 1950; 638,350 in 1951; and 805,524 in 1952. The recent figure would probably reach some one million several hundred thousand, if the "unreported, secretly performed" abortions were included.

This phenomenon is surprising and striking not only to the Japanese people but also to foreigners. The Japanese Government fearing its undesirable effects upon mothers' health among other things, decided upon a fundamental policy to replace this widespread resort to abortion with the practice of contraception as far as possible. This policy is based on the decision made in the Cabinet Council of October 26, 1951, which since then has been implemented by various measures toward this aim.

Can we, then, expect successful results out of these Government measures? In this respect, I am not necessarily optimistic, because, there has been no evidence as yet which indicates a decline in the number of induced abortions performed.

Under such circumstances, there has appeared a group of people recently which criticizes these measures claiming that they have brought about more induced abortions rather than a suppression of them. Also, there are some other groups with different opinions. For instance, some say that it is due to the

¹ Prepared in collaboration with Minoru Muramatsu, M.D., Sakito Agato, M.D., and Tomohiko Koya, M.D. Dr. Yoshio Koya is Director, and his collaborators are on the staff of, the Department of Public Health Demography, Institute of Public Health, Tokyo, Japan.

Note: The original Japanese article on this subject appeared in the *Japanese Medical Journal (Nihon-iji-shimpo)*, No. 1539, October 24, 1953. This English translation is based upon that article, but it does not correspond to the original precisely.

tendency among practicing gynecologists to want to earn more money these days, or others want to interpret the situation as a manifestation of moral decay in the Japanese society.

The author himself, however, does not consider these things so simply. Of course, there must be a number of cases where the above-mentioned reasons hold true, and yet he does not believe that they precisely represent the real explanations as to the most deeply underlying reasons for the continued increase in abortions. More fundamentally there must exist some socio-economic or ideological reasons. In any event, this phenomenon requires more thorough investigation, because, it is through such means that we can bring these differing opinions on this point along the right direction, and also that we may be able to find out better measures for preventing the further increase of abortions. Furthermore, such investigation and analysis will undoubtedly contribute to the progress of demography peculiar to Japan since this is an extraordinary phenomenon which has abruptly appeared in modern Japanese society.

These considerations were the main motivation which led us to attempt to conduct the present study since January, 1952. Consequently, our survey was bound to be intensive and of small coverage rather than extensive and of large coverage. For that reason, the districts surveyed were confined only to Keihin and Tokai regions (regions including such prefectures as Tokyo, Kanagawa, and Shizuoka), and the contents of the questionnaire used were so detailed that there were about several dozens items questioned. The samples of the questionnaire were sent to the United States before the final printing was made in order to secure opinions from two specialists in this field so that it might be as complete as possible.

What is particularly important to mention here, in the next place, is the methods employed in our house-to-house interviews. In the present survey, no other persons, such as public health nurses, were relied upon. Only the three medical doctors on the staff of the Department of Public Health Demography (two were gynecologists) conducted the personal interviews.

The districts surveyed were all in Keihin and Tokai regions, and approximately 500 families were interviewed in each of three geographical groups—large cities, medium-sized cities, and rural areas. When the analysis of data was made, however, the number of families tabulated was reduced to 462 in large cities, 464 in medium-sized cities and 456 in rural areas (1,382 families in all) because of the necessary omission of some ineligible families from each of the three groups. The survey was limited to those women who had their first induced abortion approved by a local Eugenic Protection Committee under Article 13 of the Eugenic Protection Law during the period August 1, 1949, to July 31, 1950. In the main, this article of the law permitted induced abortion with approval when "pregnancy or delivery might markedly injure the health of the mother because of her physical or financial condition".²

PART II

What I am intending to describe in the present report is somewhat of a preliminary, generalized nature, but it is of great importance if viewed from the motivation and purpose whereby the present study was started. The results of the detailed analyses of data will be published later.

The first thing we should like to know is in which of the different communities, large cities, medium-sized cities, or rural areas, induced abortion is most prevalent, and what the differences are in magnitude among the three groups. Although the data from our survey are not appropriate to answer these questions, some interesting information was obtained in this respect. That is the information which can be derived from Table 1, which represents the distribution of 1,382 wives by the number who had repeated abortions.

In rural areas, 86.0 per cent had induced abortion only once, whereas in medium-sized cities the figure is 77.4 per cent and in large cities, 69.1 per cent; thus, the proportion decreases step-

² In May, 1952, the Eugenic Protection Law was amended in regard to the procedure for obtaining an abortion, but not significantly in regard to the reasons.

SIZE OF COMMUNITY	NUMBER OF INDUCED ABORTIONS EXPERIENCED					
	Total	One	Two	Three	Four	Five
	PERCENTAGE DISTRIBUTION					
TOTAL	100.0	77.4	18.5	3.4	0.6	0.1
Large Cities	100.0	69.1	24.4	5.2	1.1	0.2
Medium-Size Cities	100.0	77.4	17.9	4.1	0.4	0.2
Rural Areas	100.0	86.0	12.9	0.9	0.2	0.0
	NUMBER OF WIVES					
TOTAL	1,382	1,070	225	47	8	2
Large Cities	462	315	113	24	5	1
Medium-Size Cities	464	359	83	19	2	1
Rural Areas	456	392	59	4	1	0

Table 1. Distribution of 1,382 wives with history of induced abortions, by number of induced abortions experienced.

wise. For the more general observation, the average number of induced abortions per woman has been calculated as follows:

Large Cities	1.4 times
Medium-Sized Cities	1.3 times
Rural Areas	1.2 times

The fact that the rate of repetition goes up from rural areas to large cities can be considered an indication that the total number of women who perform induced abortion increases from

Table 2. Age distribution of wives in the survey.

AGE GROUP	NUMBER	PER CENT
Less than 20	7	0.5
20-24	125	9.0
25-29	305	22.1
30-34	388	28.1
35-39	369	26.7
40-44	177	12.8
45-49	11	0.8
TOTAL	1,382	100.0

rural areas to large cities.

In what age group of women is induced abortion most likely to be resorted to? This is another question we want to answer. The 1,382 women were distributed by five-year

age group on the basis of age at the time of abortion as is shown in Table 2.

Those women aged between 30 and 35 give the highest pro-

AGE GROUP	BASIC AGE DISTRIBUTION PER CENT (a)	AGE DISTRI- BUTION IN OUR SURVEY (b)	CORRECTED AGE DISTRIBUTION PER CENT $(\frac{b/a}{\Sigma b/a} \times 100)$
Less than 20	8.8	0.5	0.9
20-24	14.6	9.0	10.0
25-29	19.1	22.1	18.7
30-34	17.3	28.1	26.3
35-39	15.8	26.7	27.3
40-44	13.2	12.8	15.7
45-49	11.2	0.8	1.1
TOTAL	100.0	100.0	100.0

Table 3. Correction of age distribution of wives in the survey on the basis of the age distribution of all wives in the districts surveyed.

portion and the next group is 35-39 years of age, five years older than the first, and the third is 25-29 years of age which is younger than both of the above two groups.

It must be considered in this connection, however, that the fact that there were many women who performed induced abortion in particular age groups in a selected community may be merely the result of accidental concentration of women in those age groups in that community, or that the contrary may be true. In order to generalize this finding, the actual age distribution of women in that given community must be known. In our study, however, this information was not available.

Fortunately, however, the information as to the percentage distribution of the age of wives in 119 districts, including large cities, medium-sized cities and rural areas, was available from another survey we have conducted. On the basis of this distribution, our age composition was corrected as is shown in Table 3.

When such manipulation was done, the order of the first and second age groups was reversed, but the third has remained the same; in other words, it was found out that those who are most likely to resort to induced abortion are the wives between 35 and 40 years of age, the wives 30 to 35 years of age follow them, and that those wives aged 25 to 30 retain the rank of third.

Regardless of the reversal in the order between the first and

No. OF LIVING CHILDREN	0	1	2	3	4	5	6	7	7+	TOTAL
No. of Women	37	201	245	270	227	178	118	72	35	1,382
Per Cent	2.7	14.6	17.7	19.5	16.4	12.9	8.5	5.2	2.5	100.0

Table 4. Distribution of wives in the survey by number of living children.

the second, it is to be noted that the women in the first and second groups, when summed up, represent approximately 54 per cent of the entire body. In other words, we may say that the majority of induced abortions in this survey were performed in relatively older wives, 30 to 40 years of age.

If it is assumed that this observation can be applied to the country as a whole, it is of great interest to note that it is women of middle age who are really responsible for the marked increase of induced abortions in Japan. This finding can, at least, indicate the fallacies involved in the observations that induced abortion has been mainly resorted to by extremely young women, or younger wives, as have been frequently claimed by various groups.

Incidentally, how many living children did these middle-aged women have at the time of abortion or last abortion? The answer is given in Table 4.

According to Table 4, the group of women with three children is largest, followed by the group of women with two children. This result agrees with the aforementioned distribution of women by age. Of course, these two distributions do not necessarily relate to the same individuals, but even so it is valid at least to say that women who are especially inclined to resort to induced abortion are those 30 to 40 years old, the age of mature discernment, having two or three children.

PART III

All of the women included in this study must have had a strong reason to limit the number of their children, or otherwise they would not have had an induced abortion. In this connection, it is interesting to ascertain the proportion of

women who at one time or another had practiced contraception prior to having an induced abortion. Only 372 or 27 per cent had done so. This figure is an indication of the amount of knowledge about contraception which prevailed in the group of women in the study. However, since this classification does not take into account "faithfulness" of use, it cannot be used as an indication of the effectiveness of contraceptive methods. Also, there were some women who deliberately stopped contraceptive measures in order to become pregnant and then later, because of changed circumstances, had an abortion.

Much information was obtained concerning such things as reasons for practicing or not practicing contraception and sources of information. Detailed analyses of these data will be published later. Suffice it to say now that for those who did not practice contraception, indifference and lack of sufficient knowledge were the most important reasons for not doing so. For those who did practice contraception, magazines and newspapers were the most common source of information. These findings emphasize the need for more extensive and more authoritative educational measures to promote contraception.

PART IV

Briefly speaking, the main reason for the great increase of abortions in Japan is the family economy. In other words, it is nothing but a reflection of the national economic situation on the individual household economy. This is the most essential finding obtained in the present survey, and there are a good many facts which endorse the validity of this understanding. For example, we made an exceedingly detailed questioning as to the direct motives which led these women to perform induced abortion. In relation to their first induced abortion, there were only 237 wives out of 1,382, or 17 per cent, who stated the reasons of abortion as principally health reasons; all other reasons given were related to the *fear* of difficulties in household financing in one sense or another.

In addition to these socio-economic reasons, there is a factor

of the sex of the living children which can also constitute a motive concerning the performance of induced abortion. Is there perhaps a tendency for a woman to be more willing to have an induced abortion when she has at least one male child among the children ever born to her and living at the time of abortion?

In a foregoing section it was shown that among the wives with induced abortions the group with three children was largest and the group with two children was next largest. In the distribution of the families by sex of children, can we find out any influence of selection? In today's Japan where the predominance of man over woman mostly still exists in her traditional family system, it may, probably, be pertinent to look into this particular aspect.

Of the 1,382 families in our study, there are 201 with one child, 245 with two children and 270 with three children. If these families are classified by the combination of sex of children, the results are those given in Table 5.

It can be noticed readily from this table that in each case, there are more families with only male children than those with only female children, and that, furthermore, there are more families with two boys and one girl than those with one boy and two girls in the case of three-child families.

Table 5. Distribution of wives with one, two, and three living children, by sex of children.

NUMBER OF LIVING CHILDREN, BY SEX	NUMBER OF COUPLES
<i>One-Child Families, Total</i>	201
Male Child	108
Female Child	93
<i>Two-Child Families, Total</i>	245
Two Males	69
One Male and One Female	129
Two Females	47
<i>Three-Child Families, Total</i>	270
Three Males	39
Two Males and One Female	105
Two Females and One Male	91
Three Females	35

These differences, however, may or may not be due to mere sampling errors, and hence a more detailed statistical process is required to clarify this relationship. As one method of reasoning, it is to be expected that the observed number of families with male children would be higher than the theoretically expected number from the law of probability, if the selection because of this particular desire for male child is actually working. The theoretically expected number of families can be derived from the binomial expansion of $(p + q)^n$, where n is the number of children, p is the probability of a child being born as a boy and q that as a girl. According to the statistics of the country as a whole, the values of 0.51 and 0.49 should be given to p and q respectively.

The author has thus made a comparison between the observed frequency distribution and the expected distribution by means of curve fitting, but the differences between the two did not prove to be significant, and chi-square test in each case turned out as follows:

In the case of three-child families	$P = 0.70$
In the case of two-child families	$P = 0.21$
In the case of one-child families	$P = 0.43$

Can we, then, conclude from these results that the easy feeling of having had already at least one male child is not working at all in the motivation leading to family limitation? The answer is probably no. In spite of these relatively large values of p , the author wants to emphasize the fact that the distribution is weighted toward male children in each of these cases, which are the families where induced abortion is highly prevalent. If more families were included in our study, then the tendency for a greater number of abortions to occur in families with a male child probably would be statistically significant. However, since the difference is not great, the desire for a male child cannot be considered an important influence on the behavior of present-day Japanese parents in limiting the size of their families. Economic considerations are much more im-

portant. A great many social changes have occurred in the postwar period of Japan which have exerted strong influences in various respects, but what we can state definitively is that the common desire *not to lower even a little bit the present level of living* has been strengthened. In cities, in particular, there have appeared many temptations of a post-war nature. Moreover, in rural areas, they are beginning to be seriously concerned about the newly adopted system of equal inheritance. Under such conditions, it is quite natural for the people considering their own incomes to pay attention to the limitation of the number of children which is something in their own control.

The author believes firmly that here lies the greatest and deepest cause of the recent sharp rise in the number of induced abortions in Japan.

PART V

Thus far considerations have been made on the causes and motivations of the tremendously widespread prevalence of induced abortion recently occurring in Japan. In the following paragraphs, let us make some observations on the influences of induced abortion.

The first problem to be discussed is the effect of induced abortion on the so-called family limitation, and the second is the effect it has upon mothers' health. The former presents further questions which are of great interest and are closely related to it—for instance, the influence of the induced abortion upon the reproductive process of Japan's population and the measurement of its magnitude—but only the factual analysis of the materials in respect to how soon pregnancy took place after the induced abortion will be touched upon here.

Of the 1,382 families surveyed, women who became pregnant again after abortion numbered 679, or 49.1 per cent. The classification of these women is given in Table 6.

The number of pregnancies would certainly continue to increase after the date of our interview, but the rate of increase would diminish acceleratively, as is indicated in the table, and

LENGTH OF TIME	NO. OF WOMEN	PER CENT
Less Than 6 Months	294	43.3
6-11 Months	209	30.8
12-17 Months	134	19.7
18-23 Months	31	4.6
24 Months or Above	11	1.6
TOTAL	679	100.0

Table 6. Distribution of 679 wives in the survey who became pregnant after abortion, by length of time between abortion and the following pregnancy.

so, for the sake of discussion, it will be disregarded. From this table it is seen that almost half of the women in the survey became pregnant again within eighteen months after the induced abortion, and, moreover, approximately 43 per cent of those women who became pregnant again conceived within six months after the abortion. This fact certainly serves as advice which should go to the heart of the average woman who is likely to overestimate the effect of induced abortion on family limitation.

What are the effects of induced abortion, in the next place, upon mothers' health? In this respect there have been a few observations made to date, but the materials presented here are highly reliable and valuable in that they were collected by the three medical doctors through the detailed personal interview. One drawback with this survey is, however, that no fatal cases due to induced abortion were included, since we could only visit the women who were living at the time of interview.

The number of induced abortions tabulated in this respect was 1,712. Of this total, 903 cases were reported to have experienced no post-operative complications, whereas the remaining 809 (47.3 per cent) were reported to have had abnormal conditions of one kind and/or another. The figures are given in Table 7, classified according to order of abortion.

Aside from those who died after the abortion, it is to be noted that the number of women who experienced complications, severely or slightly, is much greater than was expected and that

ORDER OF ABORTION	NO. WITHOUT COMPLICATIONS	NO. WITH COMPLICATIONS	PER CENT OF THOSE WITH COMPLICATIONS
First Abortion	731	620	45.9
Second	144	152	51.4
Third	25	30	54.5
Fourth	3	5	
Fifth	—	2	
TOTAL	903	809	47.3

Table 7. Post-operative complications in relation to order of induced abortions among women in the survey.

the proportion of post-operative undesirable experiences increases with the number of abortions experienced.

An investigation has been made as to the kinds of these complications classified by the complaints made, but the detailed information will be given later in another publication. In any event, these figures tell us that induced abortions are being performed at a considerable risk of harmful after-effects. It is considered to be of urgent necessity to enlighten the general public of this fact, especially those who believe induced abortion to be a far simpler method of family limitation than contraception.

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SOCIAL AND PSYCHOLOGICAL FACTORS AFFECTING FERTILITY

XXIV. THE RELATIONSHIP OF FAMILY SIZE IN TWO SUCCESSIVE GENERATIONS¹

JOHN F. KANTNER AND ROBERT G. POTTER, JR.

IN A previous issue of the Milbank Memorial Fund *Quarterly* there appeared an article dealing with the results of an investigation into "the relationship between family sizes of two successive generations." This study concludes, as do several other studies of this relationship, that "the size of the family from which the parents come holds an important place among the biological and social factors influencing the number of children born to them."² A test of this general conclusion can be made using data collected in connection with the Indianapolis Study of Fertility. Positive findings in the case of the present inquiry would lend confirmation to the conclusion quoted above, but it does not follow that negative findings here would upset the findings of earlier studies since in general the Indianapolis Study deals with a more restricted universe.³ The restrictions placed upon the Indianapolis sample appear to be one reason why negative or inconclusive verdicts have resulted from many of the analyses of quite plausible hypotheses which have employed data from this sample. On the other hand, the Indianapolis data afford an opportunity for greater refinement in the testing of the relationship between family size in two successive generations. This is especially

¹ This is the twenty-fourth of a series of reports on a study conducted by the Committee on Social and Psychological Factors Affecting Fertility, sponsored by the Milbank Memorial Fund with grants from the Carnegie Corporation of New York. The Committee consists of Lowell J. Reed, Chairman; Daniel Katz; E. Lowell Kelly; C. V. Kiser; Frank Lorimer; Frank W. Notestein; Frederick Osborn; S. A. Switzer; Warren S. Thompson; and P. K. Whelpton.

² Berent, Jerzy: The Relationship Between Family Sizes of Two Successive Generations. The Milbank Memorial Fund *Quarterly*, xxxi, No. 1, January, 1953.

³ For a full discussion of the Indianapolis sample, see Whelpton, P. K. and Kiser, Clyde V.: Social and Psychological Factors Affecting Fertility. IV. Developing the Schedules and Choosing the Type of Couples and the Area to be Studied. The Milbank Memorial Fund *Quarterly*, xxiii, No. 4, October, 1945, pp. 386-409. (Reprint pp. 139-162.)

so with respect to the handling of controls for contraceptive effectiveness, socio-economic status, age of wife at marriage, and duration of marriage.

In general, there are three ways in which the parental generation might influence the filial generation with respect to family size. One channel of influence—and one that may have been an important factor in earlier studies—has to do with *impulse control*. This term is meant to refer to a complex set of habit patterns resulting from early conditioning that predispose an individual to immediate impetuous action in response to insistent but deferable stimuli. Such action is not polar to rational action since alternatives may indeed be weighed. The distinction is rather that such action always discounts heavily the alternatives opposed to immediate gratification.⁴

A second channel of influence between two generations relates to the knowledge component of action. In simple terms, and with regard to reproductive behavior, similarity of family size between generations may be a function of similarity of knowledge and technique between them. This, like the first line of influence discussed, is a complex variable, for the influence of the parental generation may be effected through the types of information it transmits, through attitudes it instills toward the problem of fertility planning, and so on.

When we deal with planned families, as can be done with some success with the Indianapolis data, both of the above lines of parental influence are largely removed from consideration. The older generation then affects the family size of the younger generation, if it does so at all, by forming its notions about family size directly or by instilling preferences regarding the spacing of children, sex composition of the family, or other dimensions of the style of life that have a bearing on fertility.⁵

⁴ We are speaking here of a general quality of action which obviously need not be associated solely with the matter of reproduction.

⁵ There is no evidence among Indianapolis couples that the parental generation resorted greatly to direct pressure with regard to the size of their offsprings' families nor that those who did were successful. The lower deck of the following table suggests that most parents kept "hands off," this being somewhat more true of the

(Continued on page 296)

In the present study, consideration will be given to all three of these lines of influence with primary interest, however, in an attempt to evaluate the significance of the transmission of the elements of a style of life that have an effect on family size. This will be done by examining the relationship within a group of "efficient planners" that has demonstrated its contraceptive effectiveness by having planned family size.⁶ For compari-

father than of the mother. The table also suggests that the mother-daughter relationship is the most communicative and that husbands receive more encouragement or less discouragement than wives. However, the fact is that variation in encouragement reported by the children is not associated with large or systematic differences in fertility among the couples studied. Most interesting of all perhaps is the evidence that when the parent's attitude toward having a family is unknown to the son, his fertility is low. This was also examined among couples planning both the number and spacing of their children where it was found that if the mother's attitude was unknown to the son (25 couples) or if the father's attitude was unknown to the son (49 couples), the birth rates were 76 and 92 (births per 100 couples) compared with 106 for all couples in this planning category. Without trying to explain these facts fully, it does appear that the character of the communication between the generation rather than the overt opinions expressed by parents may be the crucial factor. For the data shown here, it appears that the dichotomy between known and unknown attitudes is the only meaningful classification that can be made of these data insofar as they affect fertility.

Births per 100 couples by extent of encouragement received from parents to "have a family of your own."

EXTENT OF ENCOURAGEMENT	PERSON ENCOURAGED AND BY WHOM			
	Husband by Mother	Husband by Father	Wife by Mother	Wife by Father
BIRTHS PER 100 COUPLES				
Encouraged Very Much	223	227	194	213
Rather Encouraged	193	190	202	196
Neither Discouraged nor Encouraged	206	206	204	204
Rather Discouraged or Discouraged Very Much	210	249	203	207
Unknown	156	175	200	200
NUMBER OF COUPLES				
Encouraged Very Much	116	74	89	62
Rather Encouraged	285	248	281	160
Neither Discouraged nor Encouraged	904	960	844	1,004
Rather Discouraged or Discouraged Very Much	87	37	202	72
Unknown	52	125	28	146

⁶ The couples considered here are those who had no pregnancies that were not
(Continued on page 297)

son, a group of "inefficient planners," as well as the total sample will be dealt with. Actually there are very few couples (around 2 per cent) in the Indianapolis sample who have not resorted to contraception of some type. There are, however, wide differences in contraceptive effectiveness which are reflected in variations in family size. Thus among the inefficient planners, low impulse control or inefficient technique may be important variables.⁸

PROPOSITION TO BE TESTED

The three principal conclusions to be reported on in this paper are the following:

1. There is a positive relationship between the size of one's family of origin and one's own family size (to be stated hence-

deliberately planned by stopping contraception in order to conceive and those whose last pregnancy was deliberately planned by stopping contraception in order to conceive but who had one or more pregnancies under other circumstances. In previous reports in the Indianapolis series, these groups have been referred to as "Number and Spacing Planned" and "Number Planned," respectively. Together they will be referred to here as "effective planners." The uninflated sample was employed in order to avoid complicating the interpretation of sampling error. (See Whelpton, P. K. and Kiser, Clyde V.: *Social and Psychological Factors Affecting Fertility. V. The Sampling Plan, Selection and the Representativeness of Couples in the Inflated Sample. The Milbank Memorial Fund Quarterly*, xxiv, No. 1, January 1946, pp. 49-93. Reprint: Vol. 2, pp. 163-207.)

⁷ This group is composed of couples classified as least successful in planning family size because one or more pregnancies occurred after the last that was wanted. In some cases, the unwanted pregnancy was wanted at the time it occurred. In previous reports this group has been classified as "Excess Fertility." Another group of couples, "Quasi-Planned" in earlier reports, who did not deliberately plan the last pregnancy, but who either wanted the last pregnancy or wanted another pregnancy, were omitted because of the large part that attitude and rationalization play in the definition. The "inefficient planners" like the "efficient planners" were drawn from the uninflated sample.

⁸ Among the inefficient planners no relationship was discovered between the size of the family of origin and the number of excess pregnancies even when the size of the family of origin of husband and wife was identical. One possible interpretation of this is to question at the start the necessity of studying the relationship of the family size of the two generations within this group since in an earlier report a positive relationship between the number of excess pregnancies and family size (of couple) was demonstrated. (Whelpton, P. K. and Kiser, Clyde V.: vi. *The Planning of Fertility, The Milbank Memorial Fund Quarterly*, xxv, No. 1, January 1947, pp. 63-111. Reprint Vol. II, pp. 209-257.) The explanation of this is obscure but may be related in part to the fact that nearly all couples in this group practice contraception with a low degree of efficiency which tends to put success in controlling family size on something approaching a chance basis. To the extent that success is random, the relationship between size of parental family and the families of the younger generation approaches randomness.

forth as the relationship between size of family of origin and couple fertility.

2. This relationship is found in connection with the size of both the husband's and wife's family of origin and is closer with respect to the wife's family.

3. The relationship is maintained within socio-economic status levels.

The first conclusion is, of course, the basic hypothesis under study. The second and third conclusions are included because they have been reported on positively in other studies.⁹ There are no obvious or compelling reasons for the second statement. It is being examined here purely as an empirical hypothesis. The third conclusion represents a refined testing of the primary hypothesis, as well as a finding reported by other investigations.

Collectively, the testing of the three propositions might be regarded as a testing of one facet of the Indianapolis Study hypothesis (number 12), which reads: "Family and childhood situations and attitudes affect the proportion of couples practicing contraception effectively and the size of the planned families."

SIZE OF FAMILY OF ORIGIN AND COUPLE FERTILITY

When the relationship between the size of the family of origin and couple fertility is examined among all couples (the total sample) it receives moderate support (see Table 1). The relationship is somewhat more apparent when the family of origin is defined in terms of sociological siblings (the children in the family, regardless of blood relationship, with whom the respondent grew up) rather than in terms of biological siblings (all children born to the biological parents of the respondent). This latter finding is consistent with the general theory underlying the present hypothesis but the low reliability of the differences between the two series does not permit great elaboration on this point.

A suggestion that the relationship might be curvilinear also

⁹ See especially Berent, *op. cit.*

appears in the data in Table 1. In no case do couples from the largest families themselves have the largest families. This question of the curvilinearity of the relationship, very weakly evident in the total sample, will be pursued more intensively in connection with the subsample of efficient planners.

The data in Table 1 are consistent with the contention that the relationship is closer with respect to the size of the *wife's* family of origin. A formal test of the significance of the difference between the two correlation coefficients—one with size of

Table 1. Births per 100 couples by number of biological and sociological siblings of husband and wife.

NUMBER OF SIBLINGS	BIOLOGICAL		SOCIOLOGICAL	
	Husband	Wife	Husband	Wife
	BIRTHS PER 100 COUPLES			
0	184	182	183	172
1	192	170	185	180
2	193	207	207	211
3	219	213	227	218
4	198	211	216	210
5	232	202	186	234
6	233	212	185	208
7	204	261	231	209
8	204	206	218 ^a	225 ^a
9	204	237		
10 or More	205	215		
ALL COUPLES	203	203		
	NUMBER OF COUPLES			
0	164	148	196	156
1	260	254	293	337
2	261	253	324	326
3	176	209	208	240
4	166	166	207	155
5	104	115	88	93
6	116	78	62	64
7	68	66	29	33
8	46	36	22 ^a	28 ^a
9	26	57		
10 or More	57	62		
ALL COUPLES	1,444	1,444		

^a 8, 9, and 10 or more siblings.

NUMBER OF SOCIOLOGICAL SIBLINGS	BIRTHS PER 100 COUPLES	NUMBER OF COUPLES
0	179	156
1	183	337
2	213	326
3	221	240
4	211	155
5	240	93
6	211	64
7	209	33
8 or More	225	28

Table 2. Births per 100 couples adjusted for pregnancies at time of interview by wife's number of sociological siblings.

the wife's family as the independent variable, one with the size of the husband's family as the independent variable—indicates, however, that the difference could easily be due to chance.¹⁰

Since we are not dealing with completed families, it is desirable to adjust the figures in Table 1 to make allowance for women who were pregnant at the time of the interview.¹¹ The results obtained if these pregnancies are counted as births are shown in Table 2 classified by the wife's number of siblings. Differences in fertility between the extremes are reduced slightly by a small increase in the average size of families in which the wife is an only child or has relatively few siblings. Fundamentally, however, the data resemble those in Table 1. With most wives in their mid-thirties, it seems likely that only minor changes in average family size will occur throughout the remainder of the reproductive life of these women. Any change in average family size that does occur will reduce even more the size of the fertility differential attributable to differences in size of family of origin if the distribution of pregnancies at the time of interview is taken as indicative of this trend.

Since the Indianapolis sample includes only women married

¹⁰ In making this test, advantage was taken of the fact that the two coefficients are computed from the same sample. The coefficients themselves reveal that less than one per cent of the variation in fertility is explained by variations in the size of the family of origin.

¹¹ There were forty-five women pregnant at the time of the interview.

NUMBER OF SIBLINGS	FERTILITY PLANNING STATUS				
	All Couples	Number and Spacing Planned	Number Planned	Quasi- Planned	Excess Fertility
	(1)	(2)	(3)	(4)	(5)
0	21.2	21.8	19.5	21.4	18.8
1	20.5	21.1	19.4	20.6	19.9
2	20.2	21.1	21.4	19.8	19.3
3	20.3	21.0	18.0	20.5	19.6
4	20.5	21.8	18.8	21.0	19.7
5	20.3	22.8	22.3	19.3	19.9
6	19.8	20.6	17.8	21.5	19.7
7	19.2	20.3	18.4	19.8	19.5
8 or More	19.7	22.8	18.5	20.4	19.4

Table 3. Median age of wife at marriage by wife's number of sociological siblings and by fertility planning status.

within a three-year period centering on 1928, duration of marriage is controlled for this sample. An additional restriction was imposed with respect to the age of the wife at marriage. Thus, the need for additional control over these sources of variation in fertility is virtually removed. This is shown further by the data in Table 3 in which the median age of the wife at marriage is shown classified jointly by the wife's number of siblings and by her fertility planning effectiveness.¹² Slight differences in the median age of the wife at marriage are observable for the total sample. Wives with the smallest families of origin were older when married than wives from larger families. Whether these differences will have a bearing on fertility subsequent to the time of interview is perhaps doubtful. As for completed fertility, these differences in age at marriage, with duration of marriage controlled, are probably less important in themselves than as an indication of socio-economic status differentials among various family of origin size groups. Within the various planning effectiveness groups, variation in the age of wife at marriage appears thus to be a negligible problem.

¹² Columns 2 and 3 are *efficient planners*; column 5, *inefficient planners* in this study.

Turning to the subsample composed of *efficient planners*, we find that here again the relationship between the size of the family of origin and couple fertility is a modest one and, in connection with the size of the husband's family of origin, negative. The linear correlation between couple fertility and size of wife's family of origin was .09 (correlation ratio = .11). The corresponding relationship with respect to the husband's family of origin is expressed by a correlation coefficient of -.05 (correlation ratio = .08). For both sets of coefficients the following null hypotheses were accepted:

$$\begin{aligned} p &= 0 \\ \eta^2 &= 0 \\ \eta^2 - p^2 &= 0 \end{aligned}$$

With none of the relationships showing a significant departure from 0, it becomes meaningless to make comparisons of the relative degree of influence of the wife's and husband's family of origin.

The curvilinearity of relationship observed among the couples of the total sample can be shown for the subsample by computing separate correlation coefficients for different ranges of the family of origin size continuum. Up to a point, couple fertility increases as the size of the family of origin increases although the degree of association is quite low. As larger families of origin are encountered the relationship becomes slightly negative, indicating that very large families of origin do not inspire the largest families in the second generation. These correlations between number of children ever born to couples

NUMBER OF SOCIOLOGICAL SIBLINGS	CORRELATION (<i>r</i>)	NUMBER OF CASES (<i>n</i>)
Wife:		
0-3	.15	251
4 or More	-.07	80
Husband:		
0-3	.06	249
4 or more	-.14	87

effectively planning family size and the number of sociological siblings of husband and wife are shown in the accompanying table. This reversal of relationship is not statistically significant¹³ but the finding has sufficient theoretical interest to warrant further investigation of it under other conditions, especially with a sample that provides more couples with large families of origin.

One reason for the low correlation encountered thus far appears to be the low correlation between the size of the family of origin of husband and wife ($r = .11$ for the total sample and $.09$ for the efficient planner subsample). A clearer relationship is evident among couples coming from families of the same size (*see* the rates in Table 4 that appear on the diagonal from upper left to lower right) with the suggestion of curvilinearity

Table 4. Births per 100 couples by number of sociological siblings of husband and wife (all planning groups).

WIFE'S NUMBER OF SOCIOLOGICAL SIBLINGS	HUSBAND'S NUMBER OF SIBLINGS				
	0	1 and 2	3 and 4	5-9	Total
	BIRTHS PER 100 COUPLES				
0	164	177	181	*	174
1 and 2	174	188	204	212	194
3 and 4	194	206	259	159	213
5-9	217	215	229	223	221
TOTAL	183	195	221	195	201
	NUMBER OF COUPLES				
0	28	77	36	15	156
1 and 2	94	282	198	82	656
3 and 4	46	172	115	59	392
5-9	24	81	65	44	214
TOTAL	192	612	414	200	1,418 ^a

* Rates not computed when $n < 20$.

^a There were 26 cases where either the husband or wife was reared in an institution or where the number of sociological siblings was unknown.

¹³ Analysis of variance tests indicate that there is better than a .05 chance that the departure from linear regression could result from sampling error. A cutting point between three and four siblings was employed in order to have an adequate number of couples in the large family subsample. The character of the results does not change if the cut is made between four and five or at higher orders.

again present.¹⁴ Measuring the relationship among these homogamous couples yields a correlation ratio of .21 which is positive and significantly different from zero. Similarly among sixty couples in the efficient planner subsample in which the size of husband's and wife's family of origin coincide, $r = .29$ with the probability that this is a chance correlation being less than .05.¹⁵ At best, then, we have succeeded in explaining less than 10 per cent of the variation in couple fertility by considering the size of their families of origin and this was achieved for only a small part of the original sample.

Among the subsample of inefficient planners the degree of relationship between couple fertility and size of family of origin is negligible. Considering only the forty couples in which husband and wife come from families of identical size, the correlation was raised to .16. As might be expected, no evidence of curvilinearity was found since this would imply the ability to limit family size on the part of those inefficient planners with large family backgrounds.

THE ROLE OF SOCIO-ECONOMIC STATUS IN THE RELATIONSHIP BETWEEN SIZE OF FAMILY OF ORIGIN AND COUPLE FERTILITY

It is possible that the very modest relationships encountered thus far might be further reduced through the application of a control for differences in socio-economic status among couples originating in families of varying size. On the other hand, the effect of variation in socio-economic status in the uncontrolled situation might be to obscure the relationship. The objective of this section of the report is thus to discover the role of socio-economic status in connection with the present hypothesis.¹⁶

¹⁴ The relationship is positive and linear so long as either member of the couple has fewer than three or four siblings.

¹⁵ Although the null hypothesis is rejected at the .05 level, the extreme instability of the relationship when couples are included in which the size of husband's and wife's family of origin differs by only one ($r = -.04$) strongly suggests that we should have accepted the null hypothesis in this case.

¹⁶ For the total sample the relationship between couple fertility and socio-economic status is inverse. Couples having large families have a low socio-economic position which in turn is associated with large families of origin. Thus, the effect of

(Continued on page 305)

NUMBER OF BIOLOGICAL SIBLINGS	INDEX OF SOCIO-ECONOMIC STATUS					
	(High)	0-19	20-29	30-39	40-49	50+ (Low)
	BIRTHS PER 100 COUPLES					
0		179	166	176	169	} 251 ^a
1		157	125	191	178	
2		168	163	178	214	
3		185	150	181	198	
4		200	188	164	208	
5		164 ^a	156	193	219	230
6-7			169 ^b	168	212	362
8 or More				212	178	306
	NUMBER OF COUPLES					
0		33	29	41	26	} 37 ^a
1		68	52	57	59	
2		47	38	60	64	
3		33	38	31	66	
4		21	33	42	48	
5		22 ^a	27	27	31	23
6-7			26 ^b	31	58	37
8 or More				34	51	47
TOTAL		224	243	323	403	251

Table 5. Births per 100 couples by wife's number of biological siblings and index of socio-economic status.

* 5 or more siblings.

^b 6 or more siblings.

^c 0 and 1.

The measure of socio-economic status is based upon the husband's occupation, his annual earnings since marriage, rental, net worth, purchase price of car, education of husband and wife, and the Chapin Social Status Scale.¹⁷

the control for socio-economic should be to reduce the relationship observed between couple fertility and size of family of origin in the total sample. Among the subsample of efficient planners the relationship between couple fertility and socio-economic status is complex. For the first four socio-economic status groups constructed for this study, the relationship is positive but couples in the lowest status group have the largest families. The effect produced by controlling socio-economic status in this case is difficult to foresee although an explanation of the curvilinearity of relationship might be forthcoming. Among the inefficient subsample, couple fertility and socio-economic status are inversely related and thus it is unlikely that the role of socio-economic status has been to suppress the relationship.

¹⁷ For a full description of this index, see Whelpton, P. K. and Kiser, C. V.: Fertility Planning and Fertility Rates by Socio-Economic Status, The Milbank Memorial Fund Quarterly, xxvii, No. 2, April 1949, pp. 188-244 (Reprint, Vol. II, pp. 359-415).

NUMBER OF BIOLOGICAL SIBLINGS	INDEX OF SOCIO-ECONOMIC STATUS				
	(High)	0-19	20-29	30-39	40-49 50+ (Low)
	BIRTHS PER 100 COUPLES				
0	149	200	177	166	} 302 ^b
1	177	132	200	190	
2	186	169	168	182	303
3	204	129	173	243	329
4	139	186	161	221	255
5	174 ^a	146 ^a	197 ^a	192	419
6-7				215	311
8 or More				176	308
	NUMBER OF COUPLES				
0	47	28	35	38	} 52 ^b
1	52	56	57	59	
2	44	59	56	67	35
3	24	28	44	46	34
4	23	22	41	42	38
5	34 ^a	50 ^a	90 ^a	49	21
6-7				61	46
8 or More				41	25
TOTAL	224	243	323	403	251

Table 6. Births per 100 couples by husband's number of biological siblings and index of socio-economic status.

^a 5 or more siblings.

^b 0 and 1.

As far as the total sample is concerned (Tables 5 and 6), the evidence is extremely weak that the relationship between couple fertility and size of family of origin is independent of socio-economic status. Comparing the end groups in each of the socio-economic groups in Tables 5 and 6 reveals that eight out of ten comparisons are consistent with the hypothesis of a positive relationship. However, the differences are generally small, cell frequencies are often low, and marked irregularities are to be noted. Even the over-all differences between end groups cannot be accepted as statistically reliable.¹⁸

¹⁸ This conclusion is based upon the Sign Test and is looked upon as a minimum test of relationship. The probability tables consulted are given in Dixon, W. J. and Mood, A. M.: The Statistical Sign Test. *Journal of the American Statistical Association*, 41, No. 236, December 1946.

CONTROLS	THREE OR FEWER BIOLOGICAL SIBLINGS		FOUR OR MORE BIOLOGICAL SIBLINGS	
	Correlation Coefficients with Regard to Siblings of:		Correlation Coefficients with Regard to Siblings of:	
	Wife	Husband	Wife	Husband
No Control	.15	.06	-.07	-.14
Socio-Economic Status	.15	.08	-.07	-.14
Feelings of Economic Security	.16	.06	-.07	-.14
Socio-Economic Status and Feelings of Economic Security	.14	.04	-.06	-.14

Table 7. Partial correlation analysis¹ of the relationship between number of children ever born to couples effectively planning family size and the number of biological siblings of husband and wife.

¹ Square root transformation employed.

In analyzing the role of socio-economic status on the relationship among the efficient planner subsample, we have again treated the upper end of the family of origin size continuum separately. The reason for proceeding in this fashion is not only to check upon the influence of the socio-economic status variable¹⁹ but to determine whether the reversal (from positive to negative) previously noted in the direction of relationship might be a function of socio-economic status and thus fail to appear when this control is applied. The results of this analysis are shown in Table 7. It appears from this that neither the modest relationships already noted between the size of families in successive generations nor the reversal of direction taken by the relationship among couples from large families are due

¹⁹ Since, among the efficient subsample, feelings of economic security show a closer relationship to couple fertility than does socio-economic status, the former variable is also employed as a control. Feelings of economic security are indicated by answers to a series of questions dealing with one's confidence in the fiscal future, employment and so on. For a full description of this measure, see Kiser, Clyde V. and Whelpton, P. K.: XI. The Interrelation of Fertility, Fertility Planning, and Feeling of Economic Security, *The Milbank Memorial Fund Quarterly*, xxix, No. 1, January 1951 (Reprint, Vol. III, pp. 467-548).

CONTROLS	CORRELATION COEFFICIENTS WITH REGARD TO BIOLOGICAL SIBLINGS OF:	
	Wife	Husband
No Control	.08	.09
Socio-Economic Status	-.02	.05
Feelings of Economic Security of Husband and Wife	.07	.09

Table 8. Partial correlation analysis¹ of the relationship between number of children ever born to couples inefficiently planning family size and the number of biological siblings of husband and wife.

¹ Square root transformation employed

to selection in terms of socio-economic status or feelings of economic security. By far the most important fact continues to be the very low and unreliable relationship, with or without controls.

A similar type of analysis among the inefficient planners suggests that the slight relationship (couple fertility to size of family of origin) previously observed within this group is partially dependent upon socio-economic status. The results are shown in Table 8.

SUMMARY OF THE RELATIONSHIP BETWEEN SIZE OF FAMILY OF ORIGIN AND COUPLE FERTILITY

Among the Indianapolis couples the relationship between the fertility of the older and younger generation is negligible except perhaps in the case of couples originating from families of identical size. Even in the latter instance, however, less than 10 per cent of the variation in the fertility of the younger generation is attributable to the size of the family of origin. Except among the efficient planners, what relationship there is appears to be partially dependent upon differences in socio-economic status. Thus we have in the case of the present relationship, a hypothesis of low predictive value so far as the Indianapolis data are concerned.

The data in some respects are consistent with the hypothesis that the wife's family of origin exerts a stronger influence on a

couple's fertility than the husband's family of origin, but the influence in both cases is so minor as to make the comparison fairly meaningless.

Interesting evidence that the relationship may be curvilinear was encountered although the reliability of the data in this connection could not be established. This nonlinearity, which is most pronounced when the relationship is examined among the efficient planners, could not be explained as a function of socio-economic status.

The low relationship that was found between the size of family in the older and younger generations, especially in connection with the inefficient planner subsample, may have a variety of explanations, none of which can be definitively isolated here. It could be, for example, that the range of the *preferred* family size was rather wide in the parental generation in which case exposure to a large family of origin and inefficient planning would not necessarily occur together. This would tend to attenuate the relationship. Or again, since we have no knowledge of the extent to which variations in family size in the parental generation were the result of fairly random factors such as sterility and chance success in avoiding pregnancies, it is conceivable that among moderately large to large parental families one might encounter, speaking figuratively, a rectangular distribution of the factors making for inefficient planning. If this were true, a low relationship among the inefficient subsample would not be surprising since around one-half of these couples come from families with four or more children. It is possible also that the unsystematic contraceptive efforts on the part of the inefficient planners of the younger generation inject a certain degree of randomness into the relationship between contraceptive discipline and family size. All of which is to say that our information about the degree of impulse control and contraceptive technique in both generations is inferential and based on family size. To the extent that family size is a poor index of these variables—and except among the efficient planners we have assumed it to be a good one—the

expected relationships based on the transmission of inefficient contraceptive habits will not materialize.

THE INFLUENCE OF OTHER FACTORS ON THE RELATIONSHIP

It has previously been shown that when both the husband and wife come from families of identical size, the expected relationship is more clearly evident. An effort was made to discover and neutralize other variables that might be suppressing the relationship. This required a certain methodological innovation for, as we now know, the low correlation coefficients encountered were due in part to the relatively large contributions to the standard error of estimate made by couples from the largest families. Thus to employ as a control any variable which selects against large families of origin would automatically increase the correlation, due to this fact alone. To overcome this defect, the regression of *difference* in family size between the two generations on size of parental family was computed. From the estimating equation the expected *difference* in family size between the two generations could be estimated for any family of origin size. For any subgroup, then, an expected *difference* of this type could be obtained (from the given average size of the families of origin) and compared with the observed differences for that subgroup. Observed differences must be less than the expected differences in order to corroborate a particular hypothesis.

A number of variables were tested in this way, but the *observed* and *expected* differences between family size in the older and younger generations varied very little from each other. The variables considered included residence background, regional origin, marital status of parents, survivorship of parents, age differences between parents and children, relative economic conditions of the two generations, childhood happiness, and frequency of contact with relatives. In each case, there were constructed certain subgroups of couples who either were believed to resemble the parental generation more closely in terms of their present characteristics than the entire sample

or else were believed to have been exposed to conditions favorable to the intergenerational transmission of attitudes and habits. Thus, the conclusion remains unchanged that, for the present sample at least, the relationship between the size of families in two related generations is very modest.

CONCLUSION

There is little more that can be said with respect to the findings of this study except to comment briefly on the more positive results reported in other studies. It would certainly be unwarranted to conclude that the relationship in question is negligible under all conditions. Where a greater range in the fertility of both the older and younger generations is found, the influence of the parental generation on the succeeding one might be more evident. Related to this is the likelihood that if couples even less efficient at contraception than those in our inefficient planner subsample were included, a greater continuity of family size pattern would be apparent. Finally, the couples taken into the Indianapolis Study were chosen in such a way as to maximize differences between the two generations: for example, many were of rural background but no strictly rural couples were sampled; many had parents with less than eight years of education, yet no couples with so little education were admitted to the sample, and so on. It is also true that the greater part of the reproductive lives of the Indianapolis couples coincided with an economic period (1927-1940) when cues received from the older generation could not be acted upon.

But, while there are definite reasons for expecting the hypothesis to have more limited significance among Indianapolis couples than it has had elsewhere, this does not diminish the importance of the conclusion that for a group such as the one studied here, the parental generation exercises very slight influence on the size of their children's families.

ANNOTATIONS

PREMATURITY, CONGENITAL MALFORMATION AND BIRTH INJURY¹

FURTHER progress in the saving of infant lives will depend very largely on the development of measures to reduce perinatal mortality, since stillbirths and early neonatal deaths are now responsible for more than 80 per cent of infant deaths. Prematurity is a factor in a majority of deaths in the perinatal period. Therefore, Proceedings of the Conference on Prematurity, Congenital Malformation and Birth Injury deal with problems of current importance and of pressing concern to public health workers.

This report brings together the results of basic research in a variety of fields which have a bearing on prevention of prematurity, anomalies and birth trauma and on management of conditions, such as atelectasis, anoxia and anemia, which affect survival. A partial listing of the problems considered will indicate the fundamental and complex nature of the problems to be solved in order to prevent congenital malformations and death of premature babies in the perinatal period.

Studies related to prematurity that are described include: the pathology of the respiratory tract with special consideration of hyaline membrane of the lung, mechanical expansion of atelectatic lungs and mechanical exsufflation; immunization in the premature infant; fetal hemoglobin and anemia of prematurity; maturation of respiratory enzymes in the central nervous system and the mechanism of anaerobic metabolism which enables the fetus to withstand anoxia; carbohydrate metabolism; the endocrine system in the premature infant;

¹ **PREMATURITY, CONGENITAL MALFORMATION AND BIRTH INJURY.** Proceedings of a Conference sponsored by Association for the Aid of Crippled Children. Published by the Association, 345 East 46th Street, New York 17, New York, 1953. 255 pages.

and obstetrical and prenatal factors in the prevention of prematurity.

The section on congenital malformation reviews the results of several laboratory experiments with the production of congenital anomalies in animals. Also, classes of malformations in human embryos and newborn infants are described, and various mechanisms of maldevelopment are postulated. In this section, the application of epidemiological methods to the study of association of congenital anomalies and disabilities occurring in human populations with events occurring during pregnancy and parturition and with various characteristics of the mother is discussed. Studies in New York State of children with cerebral palsy and of mental defectives suggest an association between prematurity and these conditions. From a statistical study of malformed infants born at Boston Lying-In Hospital, data are presented which indicate an association with prematurity, fetal loss and complications of pregnancy.

Conditions related to birth injury which are considered include late pregnancy hemorrhage, anoxia in the newborn infant, and pelvic contraction.

It is apparent from the data presented at this Conference by experts in many fields that research in progress is adding significantly to our knowledge of fetal development and of factors affecting a successful outcome of pregnancy. The outlook is hopeful that a solution of some of the problems can be expected in the near future and will result in better protection of life and health of the newborn infant. In many areas, much research is still needed.

DOROTHY G. WIEHL

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GROUP DYNAMICS¹

WHEN social science is big business, as it is today, one is not surprised to find certain segments flourishing while others appear to move at a more settled pace. The area of interest which is encompassed by the term "group dynamics" is one which has had a

¹ Cartwright, Dorwin and Zander, Alvin (Editors): *GROUP DYNAMICS: RESEARCH AND THEORY*. Evanston, Illinois, Row, Peterson and Company, 1953, xiii + 642 pp. \$6.00.

booming growth since World War II. The term is primarily associated with Kurt Lewin, his associates, students, and the Research Center for Group Dynamics at the University of Michigan, and these are heavily represented in the text.

The tenor of the text, which is composed of forty-one essays, is largely set by the editors, Cartwright and Zander, who are, respectively, Director and Program Director at the Research Center for Group Dynamics. What is in the tradition of the Lewinian topological psychology is best reflected in the six essays the editors themselves author and which serve to introduce the various sections of the book. These essays are in lucid and readable style, and suffer only from the particularistic language associated with the Research Center and from an apparent conflict of purpose of being concretely discursive and general.

While the remaining essays are garnered from many sources, there is no question that the heavy mark of Lewinian influence persists. However, newly emphasized approaches to research, such as Bales' interaction process analysis, also receive prominence in this text. Sociometric studies, and some satellite contributions round out the fare.

In a brief annotation it is not possible to review the many contributions in detail. It is a relative pleasure when the reviewer can state that the essays are of consistently good quality, which is the case here, but there are still some limitations which need to be mentioned. The job of editing has resulted in some essays which are briefer than the originals as published in the journals, and in some cases several publications have been joined, but there is a marked repetition of introduction. One will not be bothered by this unless he tries to read more than one or two essays at a time.

A second point that may be disturbing to the careful reader is that in many cases the hypotheses which are being tested appear to be either self-evident or trite in the light of the results. This is something of an illusion, and a good exercise for the reader is to imagine that a particular hypothesis is in fact rejected when it is not rejected. How easy is it to rationalize the opposite result? Which raises the other side of the coin, and that is that the reader may at times ask why other possible aspects of an experiment are not reported, or from how many possible tests of hypotheses those reported stem. In some cases one may be left wondering if the hypothesis originated when a

relationship was found. In part, the question will stem from the enormous emphasis on procedure and methodology; these are offered as contributions, at times, in lieu of adequate testing of the intended hypotheses. This, possibly, is a criticism that is more general than the particular studies of this text deserve, since there is little question that they are well selected.

A last point that the reader may find disturbing is, that, in spite of the editors' noble attempts at integration, there are wide gaps between the selections, and one does not have the feeling that the area is well covered. Nevertheless, this text is definitely a major contribution and serves as the best source on group dynamics and small group research currently available.

Aside from classroom use, which might be considerably restricted since effective use will depend quite heavily on the instructor, this collection of readings will be an important item for all persons working in the behavioral sciences. Practitioners at various levels, from group workers to psychiatrists and from personnel managers to top executives, will want to read these materials if they have a genuine interest in understanding behavior, and in finding out the source of some of the ready made generalizations that appear in the sugar-coated literature.

Persons interested in research in substantive areas of investigation, such as the family, population problems, housing, public health administration, and so many others, should take cognizance of the work in this area. While a good deal of the research reported is "purified" in the laboratory, the theoretical ramifications are of importance for those who depend on sociological and psychological theory for the eventual prediction of trends, if not the understanding of them. Many ideas need to be developed in this new flourishing area, but some are already available for the enterprising researchers in other fields.

EDGAR F. BORGATTA

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FERTILITY AND MORTALITY IN AN INDIAN DISTRICT¹

IN 1951, a Section on Demography and Population Studies was established at the Gokhale Institute of Politics and Economics

¹ Dandekar, V. M. and Dandekar, Kumudini: *SURVEY OF FERTILITY AND MOR-*
(Continued on page 316)

(located in Poona, a city southeast of Bombay, India) for the purpose of expanding the Institute's research program in fertility and mortality. The volume under review is a report of a demographic survey in Poona undertaken during the first year of the existence of this Section.

The main objectives of the survey were to study the socio-economic correlates of fertility and mortality and to investigate attitudes toward family planning and limitation. For purposes of analysis, Poona, which is one of the central districts of the Bombay State with a 1951 population of close to 2 million, was divided into the city of Poona, other urban areas, and the rural sections of the district. The sampling base employed was the biological unit of the family defined relative to the male head. Fortunately, the survey was able to draw on the data of the recent 1951 Census. Three interview schedules were used, one relating to the main investigation into fertility and mortality, and two on male and female attitudes toward family planning.

The survey results for 1,180 families in the city of Poona and 1,006 families in the remainder of the district are relevant mainly for the fertility variable; much of the mortality data, although it provided a basis for the construction of detailed life tables for the area, for various reasons proved inadequate to justify elaborate analysis. The relationship between marital fertility and such variables as age of woman at marriage, duration of marriage, differences between ages of husband and wife, caste, occupation of husband and wife, education, income, etc. was analyzed mainly by the use of the chi square test of significance of differences. For the main part, this statistical analysis showed no significant results, particularly with the socio-economic variables. The authors claim, however, that some semblance of differential fertility is emerging with reference to occupation, caste, and education, but the differences are very small.

Perhaps the most provocative section of this publication is the chapter reporting the results of the survey on attitudes toward family planning. The authors claim that the rapport established between interviewers and respondents on this subject was, in general, quite satisfactory. In the City proper, only 9 per cent of the male heads of families answered affirmatively to the question of whether they

TALITY IN POONA DISTRICT. Gokhale Institute of Politics and Economics, Poona (India), Publication No. 27, 191 pp., 1953, Rs 5 or 7s. 6d.

were practicing contraception; in the remainder of the district the corresponding proportion was less than 2 per cent. These results also accurately reflected the proportion ever having practiced contraception. Hardly any of the respondents who reported not having practiced contraception claimed any knowledge of the subject at all, but many claimed that they would welcome information. Significantly, moral and religious objections were voiced by only a small minority of the total group. In regard to the future of contraception in the area, the authors state that "the people are neither hostile nor indifferent—a steady flow of scientific knowledge regarding contraception and provision of facilities within the means of those wishing to adopt it in practice is urgent and will, it appears to us, produce lasting results."

The report is concluded with a presentation of a number of case studies of people's reactions to the subject of birth control. These profiles are quite illuminating of the various psychological points on the acceptance-rejection scale. A common theme that appears to pervade the negative reactions, particularly among the poorer classes, is a kind of fatalistic acceptance of one's station in life. This is an attitude of particular significance in any assessment of the prospects of social change in India.

In general, this work can be considered an important contribution to our demographic knowledge of India and particularly to our rather sparse knowledge of popular attitudes toward family limitation. On the other hand, several minor criticisms can be enumerated. The proof-reading especially could have been better. The authors tend to rely entirely too much on the chi square test in their statistical analysis. Occasional presentation of rates or averages would have facilitated study of the tables. It would also have been helpful had the authors clearly offered their opinions on the representativeness of this study for the Indian population at large—an admittedly risky but inevitable question.

CHARLES F. WESTOFF

The first part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a full understanding of the present. The author then goes on to discuss the various factors which have shaped the development of the United States, including the influence of the British, the Spanish, and the French. He also discusses the role of the American people in the creation of the nation. The paper concludes by stating that the study of the history of the United States is a task of great importance, and that it is one which should be undertaken by all who are interested in the future of the country.

BOOKS

In Collaboration with the Milbank Memorial Fund

- APPROACHES TO PROBLEMS OF HIGH FERTILITY IN AGRARIAN SOCIETIES.** 1951 Annual Conference of the Milbank Memorial Fund. 1952. 176 pp. \$1.00.
- FOUNDATIONS OF SOCIAL MEDICINE.** 1947 Annual Conference of the Milbank Memorial Fund. 1948. 204 pages. \$1.00.
- ETIOLOGY OF MENTAL HEALTH AND DISEASE.** PROCEEDINGS of the Round Table on Biological Aspects of Mental Health and Disease. 1950 Annual Conference of the Milbank Memorial Fund. New York: Paul R. Hoeber, Inc., 1952. 720 pages, 218 illustrations. \$3.00.
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- EPIDEMIOLOGY OF MENTAL DISEASE.** 1945 Annual Conference of the Milbank Memorial Fund. 1946. 194 pages. \$1.00.
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- INFECTION IN RELATION TO HEALTH AND DISEASE.** 1949 Annual Conference of the Milbank Memorial Fund, 1950. 252 pages. \$1.00.
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- IMPROVEMENT IN PUBLIC HEALTH.** 1951 Annual Conference of the Milbank Memorial Fund. 1952. 284 pp. \$1.00.
- PHYSICAL AND ENVIRONMENTAL FACTORS AFFECTING FERTILITY.** Volumes II and III. New York: Milbank Memorial Fund, 1950 and 1952. \$1.00 each.

